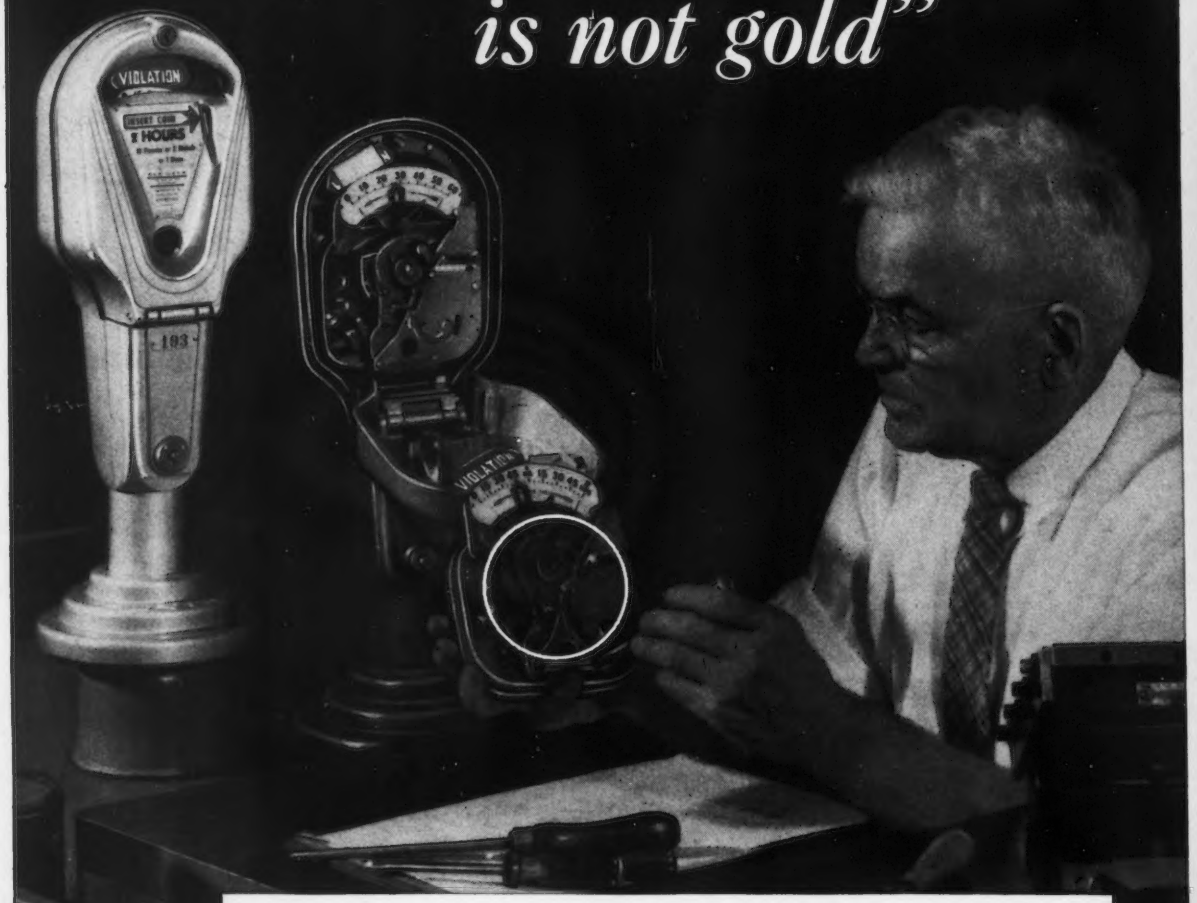
AUGUST, 1957

TRAFFIC ENGINEERING

- Detroit's Sign Shop Goes Modern
- Special Operational Problems on Controlled Access Facilities —Part II
- The Parking Problem — Detroit Finds an Answer
- Performance Budgeting for Traffic Engineers

INSTITUTE OF TRAFFIC ENGINEERS
ITE
FOUNDED 1930

"All that glitters is not gold"



Brass glitters just like gold. The heavy duty brass gearing (enclosed in a stainless steel case) in Dual Parking Meters is one of many reasons why Dual's are your best investment.

The outside of a meter could be gold, platinum or silver, but, like a watch, it's what's inside that counts. It's the heart of the meter . . . the working mechanism that spells the difference between lost revenue with high maintenance and full revenue with lowest maintenance costs.

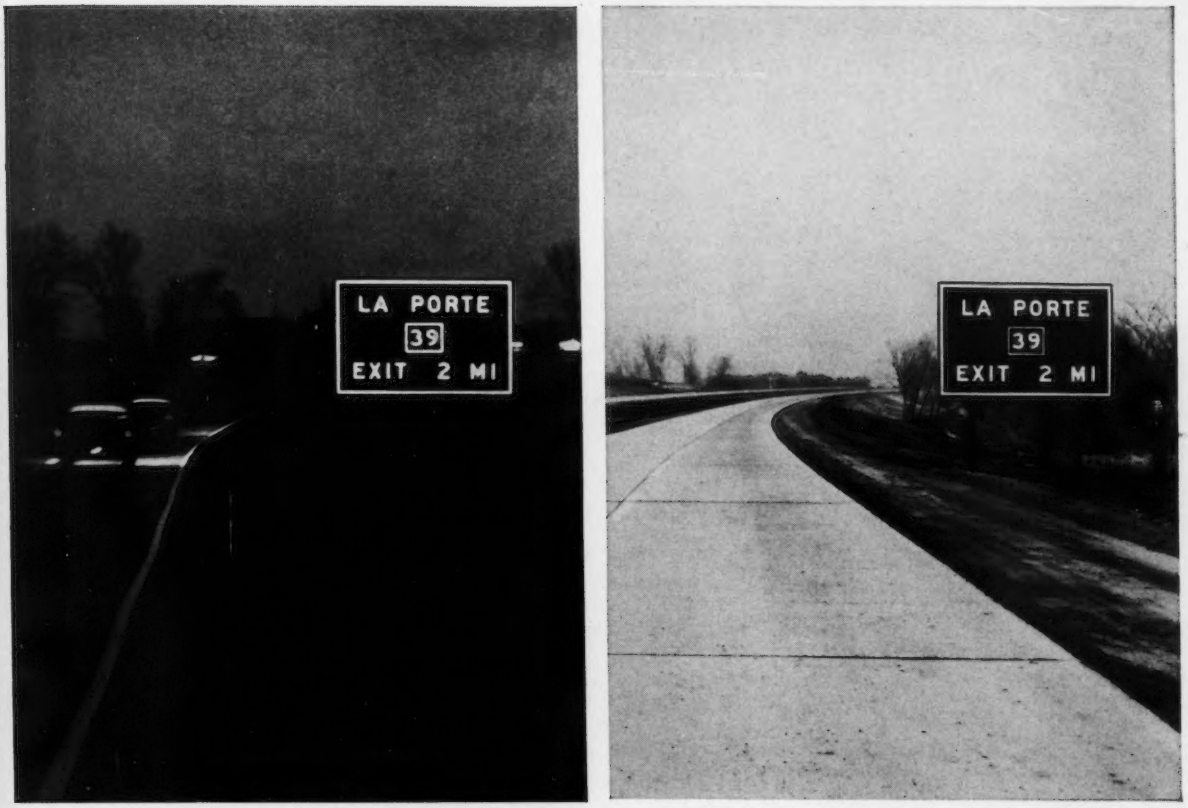
Precision design and rugged construction of the Dual mechanism has been proved all over the world. Users know that Single and Dubl-Dual automatic Parking Meters work better, stay in service longer, cost less to use.

For additional details, write Dual Parking Meter Company, subsidiary of Rockwell Manufacturing Company, Pittsburgh 8, Pa.

ROCKWELL

DUAL

PARKING METERS



STIMSONITE signs, read easily day or night, are standard on most of the nation's new controlled-access highways.

on the Indiana Toll Road...

STIMSONITE SIGNS SHOW THE WAY

STIMSONITE letters assure sharp legibility even in the dangerous hours of dawn and dusk.

Night or day, STIMSONITE signs provide brilliantly legible, attention-compelling messages. Because they "speak louder" than other signs they are *safer* signs for high speed traffic. That is why STIMSONITE is *first* choice for the nation's major highways.

Embossed, aluminum cut-out letters, assembled with STIMSONITE® plastic reflectors, are non-fading and weather proof; they do not require maintenance or renewing. The unique prism construction of the STIMSONITE reflectors returns the maximum amount of light from headlamps, thus ensuring optimum visibility.

Qualities like these make STIMSONITE signs the safest and most economical choice for your signing programs. Specify them for the outstanding efficiency and economy they offer.

STIMSONITE® *for* — *Seeability* / *Readability* / *Durability*

AGA DIVISION

ELASTIC STOP NUT CORPORATION OF AMERICA

1027 NEWARK AVENUE, ELIZABETH 3, NEW JERSEY

Brighten the Stripe for Safety . . . with CATAPHOTE REFLECTIVE TRAFFIC BEADS

Moments ago this scene lay shrouded in shadow. Then . . . out of the night comes brilliance . . . to serve the cause of safety.

Approaching headlamps spill their light upon the roadway and distant pavement markings leap from the darkness . . . as if by magic. No witchcraft, this . . . but the man-made magic of Cataphote Reflective Traffic Beads.

Manufactured from high-grade optical crown glass, Cataphote beads are highly resistant to traffic wear and the effects of weathering. Easily applied by a bead dispenser on any standard striping machine, they provide immediate reflectance and lower paint drying time. Available plain, or waterproofed for all-weather visibility.

Let the man-made magic of Cataphote Reflective Traffic Beads add nighttime visibility to your traffic markings. You'll be rewarded with increased safety, improved channeling of traffic and markings that will outlast plain stripes by 50%.

Remember . . . *any stripe worth laying is worth reflectorizing . . . by Cataphote* . . . manufacturers of a full line of non-electric traffic control products, all backed by nearly 30 years of specialized experience and research.

Cataphote CORPORATION

TOLEDO 10, OHIO
JACKSON, MISSISSIPPI

TRAFFIC ENGINEERING

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

Vol. 27 AUGUST, 1957 Number 11

INSTITUTE OFFICERS

J. CARL McMONAGLE
President

JOSEPH E. HAVENNER
Vice-President

MATTHEW C. SIELSKI
Vice-President

EDWARD G. WETZEL
Secretary-Treasurer

DIRECTORS

ROBERT A. BURCH
District Number 5

GEORGE J. FISHER
District Number 4

GORDON K. GRAVELLE
District Number 2

HERBERT C. HIGGINS
District Number 6

GEORGE W. HOWIE
District Number 3

FRED W. HURD
District Number 1

CHARLES W. PRISK
Immediate Past President

PUBLICATION STAFF

DAVID M. BALDWIN
Editor

G. A. BACCHUS
J. W. CHAMBLISS
C. C. CLARK
WM. E. CORGILL
R. E. DUNN
M. J. HUBER
WM. L. MARVIN
E. A. MUELLER
C. C. ROBINSON
S. T. SIEGEL
BURT WHEDON
Associate Editors

CONTENTS

FEATURES

Detroit's Sign Shop Goes Modern 505
Arthur C. Gibson

Special Operational Problems on Controlled Access Facilities, Part II 509
Charles M. Noble

The Parking Problem—Detroit Finds an Answer 512
Ron Hall

Performance Budgeting for Traffic Engineers 514
Dave Beers and John T. Hanna

NEWS

Traffic News 517
Training Opportunities 518
New Appointments 519
Strictly Business 521
New Publications 525
Coming Events 539

INSTITUTE AFFAIRS

Yearbook Changes 526
27th Annual Meeting Program 526
Section News 527
Membership Applications 542

MISCELLANEOUS

Positions Available 529
Reference Notes
School Crossing Protection 530
Parking Meters 536
Professional Service Directory ..... 542 & 543
Index to Advertisers 542

COVER PHOTO:
Detroit skyline above the John C. Lodge expressway.

TRAFFIC ENGINEERING is published monthly by the Institute of Traffic Engineers. Editorial offices are at 2029 K Street NW, Washington 6, D.C. Advertising plates should be sent to Interstate Printing Corp., 400 Watchung Avenue, Plainfield, N. J. For advertising information other than California, address Traffic Engineering, P. O. Box 1015, Plainfield, N. J. For California information, address Jess M. Laughlin Co., 3757 Wilshire Blvd., Los Angeles 5, Calif.

Entered as second-class matter November 7, 1941, at the Post Office at Plainfield, New Jersey, under Act of March 3, 1879. ¶Single copies 40 cents, subscription price $3.50 per year in the United States; $4.75 per year to foreign countries.

The Institute is not responsible for any statements made or opinions expressed in its publications. Publication of advertising does not constitute Institute approval or endorsement of the products or services advertised. Permission to reprint contents with customary credit line is given unless otherwise stated.

aily Journal

Volume 40
Number 16

ws That Interests All

May 17, 1957

CITY PARKING AUTHORITY OKs TOKENS

Good-will Coins Big Success!

Mr. Irving Half, Chairman, Homestead Borough Parking Authority, Homestead, Pa. operates a Duncan-Miller Model 60 Meter with Good-Will token.

Shoppers Parking Stores, a collective group of Homestead, Pennsylvania merchants interested in the promotion of adequate customer parking, readily agree that the availability of Duncan-Miller's Good-Will Token Feature has provided the means for each merchant, large or small, to participate in this low cost program of customer parking subsidization.

BUSINESS ASSET

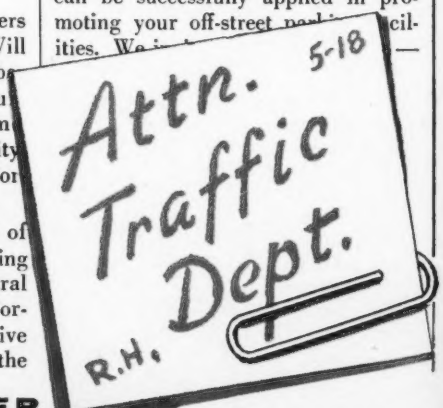
By making it possible for all merchants to take an active part in the promotion of off-street parking facilities through the use of the Good-Will Token, the return of direct benefits in the form of continued customer patronage are equitably distributed throughout the business district.

After one year of operation, a total of 86,257 Good-Will Tokens were inserted into 222 Duncan-Miller Model "60" Meters in three off-street lots. This represented a total of 43,128 hours of free parking time given to customers of Shoppers Parking Stores as a gesture of appreciation for customer patronage. Each token issued at the merchant's discretion purchased one-half hour parking time in a Duncan-Miller Meter.

Merchant members of Shoppers Parking Stores purchase Good-Will Tokens from the Homestead Chamb of Commerce, who in turn procu them at nominal cost from the Hom stead Borough Parking Authority administrative operators of the Bo ough's off-street parking program.

By recognizing the importance of adequate off-street customer parking as a business stimulant for the central business district, the Homestead Borough Parking Authority's progressive development program, under the forceful direction of its Chairman, Mr. Irving Half, represents an outstanding example of achievement through co-operative effort.

There is no question the advantages of Duncan-Miller's Good-Will Feature can be successfully applied in promoting your off-street par cil- ities. W —



DUNCAN PARKING METER
835 NORTH WOOD STREET, CHICAGO 22, ILLINOIS • FACTORIES: HARRISON, ARKANSAS AND MONTREAL, P.Q., CANADA
Manufacturers of fully automatic and manual parking meters.

Frankly Speaking . . .

TRAFFIC ENGINEERING TECHNICIANS are just around the corner! The demand for engineers is having a profound effect upon the profession. Because of the lack of engineering man power, ingenious devices are being devised for work previously done by a professional engineer. For example, aerial photography is greatly minimizing the work of surveyors. Technical schools are already training non-college men to do basic surveying. With the great strides in computors, earthwork computations can be done in ten minutes time whereas they previously required the work of an engineer for a week! Drafting procedures have been perfected to the extent that it is no longer necessary to have a college graduate do much of this work. Thus we are entering an era in which technicians are freeing the professional engineer of much of the detail work and permitting the professional to concentrate on the complex engineering problems.

This trend in engineering is healthy for our own profession. For many years, we have been confronted with the problem of membership qualifications. In the future, it is quite possible that we will be an organization comprised of two classes—technicians and college-trained traffic engineers. The technicians will be able to relieve our skilled engineers of many of their basic responsibilities which do not require scientific knowledge. Our professional engineers can then direct their attention to those aspects of the traffic engineering problem which are complex and require scientific knowledge. These are healthy straws in the wind and may well solve the professional status of the engineer.

MATTHEW C. SIELSKI
Vice President
Institute of Traffic Engineers

NOW! SAVE TIME • MONEY • LABOR

with new

FLEX-O-LITE

FREE FLOWING GLASS BEADS

FLEX-O-LITE INTRODUCES NEW FREE FLOWING REFLECTIVE GLASS BEADS

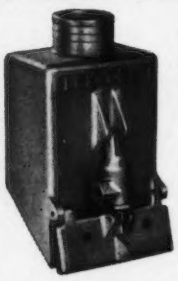
Flex-O-Lite Manufacturing Corporation, St. Louis, producer of reflective glass beads for highway markers and signs, has been granted a patent incorporating seven claims for the manufacture of its new free flowing glass beads, it was announced today by

New highs in humidity resistance, workability, ease of application, brilliance and reflectivity are available in new Free Flowing Glass Beads by Flex-O-Lite... finest achievement of the reflective glass bead manufacturer's art.

The result of five years of research and development, they were fully tested for 24 months with the cooperation of highway and traffic engineers. Already they are in use in several states and in many cities throughout the country. A trial order will convince you. Write us today for details and free Specifications Booklet.

LOOK AT THESE OUTSTANDING FEATURES:

1. Marked resistance to high humidity
2. Flow freely through dispensing equipment
3. Store for unlimited periods without agglomerating
4. Contain no injurious waxes, oils, resins or silicones
5. Offer perfect adhesion to any suitable traffic bead binder



New Flex-O-Lite Positive Free Flowing Bead Dispenser

Economical answer to the problem of reflective glass bead application. Works equally well with Standard Type A, "Free-Flow" or Moisture-Resistant Type C beads. Available in 4, 5, & 6" widths. Completely automatic or may be manually operated. Send for folder.

FLEX-O-LITE MANUFACTURING CORP.

FLEX-O-LITE

Post Office Box 3066 (Affton Branch) • St. Louis 23, Mo.

Detroit's Sign Shop Goes Modern

by Arthur C. Gibson
(Assoc. Mem., ITE)
Associate Traffic Engineer
City of Detroit

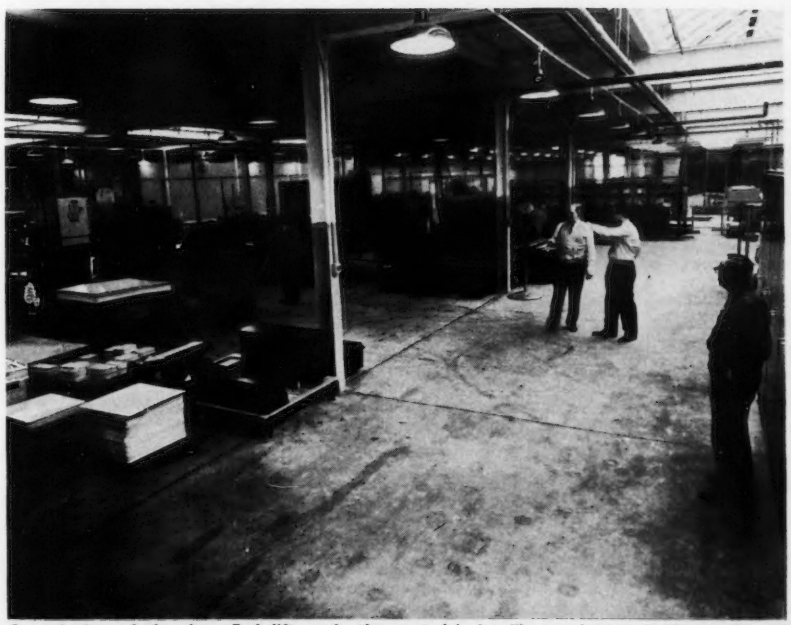
THE DETROIT Department of Streets and Traffic was established in 1951 by Charter Amendment as the successor to the Traffic Engineering Bureau. It was created to provide centralized responsibility for the safe and expeditious handling of traffic within the City of Detroit. Among the important tools available to the traffic engineer to meet this responsibility are such traffic control devices as signs and pavement markings. The value of these tools is well recognized not only by the profession but by the motoring public.

The Traffic Sign Division of the Department of Streets and Traffic has the responsibility to manufacture, erect, repair and replace all such devices on a regular program basis as well as street name signs and parking meters. This program is established by the Traffic Control Division of the Department, which employs eight full-time traffic investigators who constantly check field conditions throughout the city and write work orders to initiate action on traffic control projects. In addition to these men, an engineer supervises the design of all signs and the layout of all pavement marking work required within the city. This system insures that only standard signs and pavement markings will be used and then only at locations where warranted.

In order to give some idea of the magnitude of work and the size of the task confronting the traffic sign division, the following facts should be pointed out:

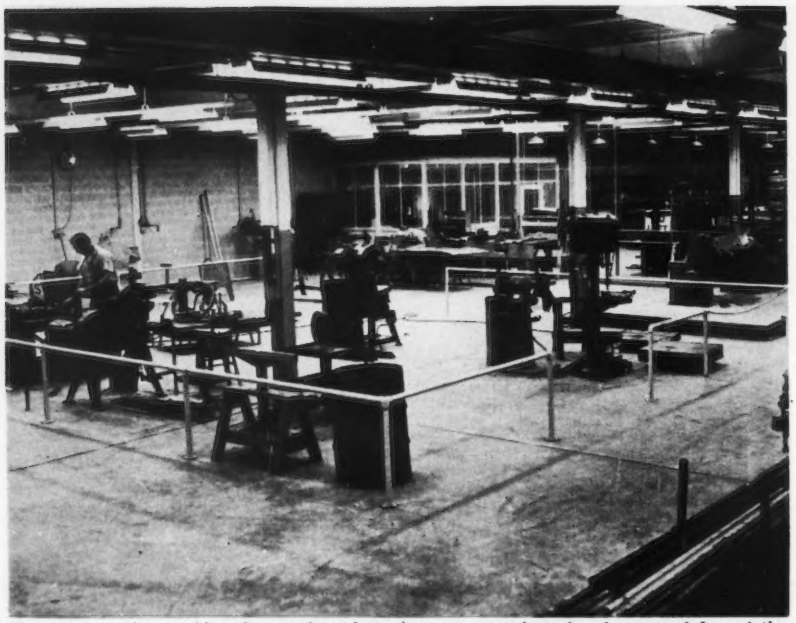
a. In 1945, there were approximately 40,000 signs on the city streets. Today, this totals more than 110,000.

b. There are now 130,000 street name signs in existence.



General view of the shop. Fork-lifts and other materials handling equipment facilitates flow of materials.

Raw materials can be brought right to the processing plant and finished signs or equipment can be quickly loaded and dispatched from the combination loading dock and garage.



The metal-working machine shop section where signs are cut, trimmed and processed for painting or for application of reflectorized material.

c. In 1940, about 3,500 gallons of street paint were purchased. Today, more than 19,000 gallons are used each year.
d. Better than 6,000 parking meters are in operation, controlling parking in more than 8,000 parking stalls.

All twenty-four hour signs plus the street name signs are currently fabricated of aluminum covered with reflective sheeting. These are replaced on a six-year cycle. All other signs are fabricated from steel coated with enamel, and are replaced on a four-year cycle.

All major streets are painted at least twice each year, and school crosswalks are painted once annually. In addition to street painting, shop personnel also use about 2,000 gallons of primers, enamels, and stencil paints of various colors yearly in the painting of traffic signs.

For many years, all of the sign fabrication and painting was carried out in two small buildings with inadequate floor space for paint facilities. Because of the increasing amount of work and due to the antiquated design of the building, it became apparent to the Streets and Traffic Commission that new and modern facilities should be acquired. In December, 1954, the city began construction of a new shop. Approximately one year later, all other activities of the traffic sign division were moved into this plant. While there are additional procedural changes to be made, it is generally agreed that this new facility is one of the most functional sign shops in the United States. Its modern design plus the special equipment which it houses have increased the efficiency of the traffic sign division substantially.

Processed reflectorized material is mounted on metal in a custom-tailored fabricating machine.

Sign Shop Layout

In order to determine the best possible layout for a new shop, individual rooms were designed for every existing or planned shop activity. Floor area was then allocated on a rough floor plan and the flow of material through the shop was carefully checked. After several revisions, the final floor plans were drawn. The building is 142 feet wide by 230 feet long with a 16-foot ceiling height throughout the working area. This ceiling height made it possible to provide a mezzanine across the front portion of the building to house offices and locker rooms with a completely isolated, fireproof storage space underneath for paint.

The heart of the shop is the central stockroom where all raw materials and finished signs are disbursed on requisition only. A central stockroom of this type permits accurate inventory control for the first time in the history of this department.

A complete sheet metal shop is also provided with all of the equipment necessary to fabricate sign blanks. Space is provided for chemical treatment and painting of sign blanks on a conveyorized system. One entire side of the building is used for a combination garage and loading dock for the fleet of twenty-four trucks operated by this division. This means trucks can be loaded directly from a stockroom thereby conserving space and adding to the overall efficiency.

Traffic Sign Manufacture

Traffic signs may be made of many materials including steel, aluminum, plywood, or plastic. Detroit has experimented with almost every type of

material that has been introduced, but all signs are manufactured with metal at this time. The primary reason for this is that metal lends itself more readily to reclamation, which is a vital factor in our maintenance procedure.

Metal sign blanks may be purchased cut to size or metal sheets may be purchased and cut in the shop. We have a complete sheet metal shop in our new plant with squaring shears for blanking out signs and with punch presses for cutting corner radii and punching mounting holes. The decision to purchase metal sign blanks or sheets is dependent upon market conditions in the city at the time of purchase. Many times it has been possible to purchase blanks cheaper than full sheets because shops supplying the automotive industry were attempting to keep in operation during otherwise slack periods.

All metal must be completely cleaned before it can be painted or have reflectorizing material applied to it. New metal is often marked with rust spots and is always coated with either coating oils or protective oils. These things can be removed in several ways but we have found that washing in chemical solutions is the most effective and economical process. The type of chemical and the duration of treatment is dependent on the amount and type of oil and spots to be removed. After the metal is cleaned, the surface must be etched with a phosphate compound to provide a good surface for paint adherence. In the case of steel signs this step is followed by applying one coat of primer and two coats of baking enamel and then stenciling the legend on the painted blank.

The equipment provided in the new shop enables shop personnel to wash and phosphate the metal blanks and apply the prime coat of paint in one operation on a conveyorized system. All steel blanks are stored with only the prime coat on them until the final color requirement is established. The final coat of enamel is applied in a modern spray booth and this finish is baked in an infra-red oven.

Aluminum signs require only a complete washing and a light etching to make them ready for the application of reflective sheeting. The elimination of painting operations and the handling problems involved is one of the factors that brought about a decision to use aluminum more extensively in sign work. Gradually all reflectorized signs will be made from aluminum blanks because of the ease of fabrication and an expected increase in street life.

Special room provides ample space for cutting and storage of silk-screen stencils of the more than 2,100 different messages required.

The next step in the manufacturing of signs is the placing of the sign legend on the painted or reflectorized sign blank. All sign work is done by the silk screen stencil method. As mentioned before, the original drawing of every sign layout is done under the supervision of a traffic engineer. From this point two different methods of making silk screen stencils are employed. In the first method, the legend is cut by hand from stencil film and this film is then adhered to silk, which has been tightly stretched across a wooden frame. In the second method, a film positive of the sign is made and this is exposed to photographic stencil film in a printing frame and then adhered to the silk. Both of these methods

Workers print street name panels in special silk screen forms and place them on drying racks. Thousands of signs can be duplicated before the silk screen wears out.

Sign "library" has an inventory of more than 10,000 signs of 130 different types bearing 2,100 different messages.

have certain advantages, which are dependent on the size of the sign and the size of the letters utilized. Because of the wide range of the sign sizes that are used, both methods of stencil manufacture are used.

Stencil paste is applied with a squeegee drawn across the silk screen on both painted and reflectorized signs. Nearly any color of paste that may be required is available in opaque colors and many are available in transparent colors. The increased use of colors in traffic guide signs and the use of reverse screened signs is coming into wide spread use. The manufacture of these special signs pose no problem when silk screens are used. The use of silk screen stencils may appear costly because of the initial investment but the long life of these stencils makes them relatively inexpensive.

After the signs are completed, they are placed in storage racks in a central stockroom. A basic inventory of every sign legend used on the city streets is maintained in this stockroom. This enables the quick replacement of missing signs or the installation of new signs on short notice. Experience has shown that more than 10,000 signs are needed in the central stockroom in order to properly service and maintain the 110,000 signs already on Detroit's streets.

Spacious and well-lighted work room enables 17-man crew to check, maintain and repair the 6,500 parking meters installed in the city which control 8,200 metered spaces.

The investigator in the Traffic Control Division orders signs from the sign shop on four types of work orders. He may order signs for installation, replacement, repair or emergency. These work orders show the code number of the sign to be used, the type of mounting required and the exact location for installation. The work orders are submitted to the shop where a foreman makes up a shop order to have these signs either taken from stock or fabricated. As soon as the signs are ready, the storekeeper notifies the foreman, and the signs and work orders are turned over to a sign installation crew. This crew returns the work order to the foreman when the work is completed and dated. Completed work orders are then sent back to the Traffic Control Division and are placed in file so that a current record of every sign on the street in this city is readily available.

As might be expected, this file has become voluminous with the passing years, and in order to have information available for inventory purposes and for budget preparation, this department has just started putting all of these work orders on punch cards. When this project is completed, it will be possible to ascertain how many signs of a given size or of a given legend are in use in the City of Detroit and how many will require replacement in a given year. This type of information will aid the Accounting Division in preparing budget requests and will aid sign shop stock room personnel in maintaining the proper inventory of various sizes and types of signs.

Pavement Marking

The use of pavement markings to delineate paths of travel for vehicles, to establish proper stopping and storage points and to guide pedestrian traffic across streets is of proven value in the handling of traffic. The use of lane lines is the most economical method of insuring full utilization of a street's capacity, and no other traffic

(Continued on page 523)

Special Operational Problems on Controlled Access Facilities

PART II

by Charles M. Noble
(Mem., ITE)
Secretary to the Governor
State of Ohio

Note: This paper originally appeared under the same title as Proceedings Paper No. 1249, Journal of the Highway Division, Proceedings of the American Society of Civil Engineers, Volume 38, No. HW2, May 1957.

CONTROLLED ACCESS HIGHWAYS will, in general, be constructed with a median separating opposite direction traffic and with all crossings grade separated. In urban areas many long viaducts will be constructed. These features make it necessary to provide operational facilities in the original design.

Police, towing, wrecking, ambulance, fire department, roadside gasoline patrol service and maintenance operations require crossovers in the median. Without this flexibility, the effective operation of servicing units will not be feasible to a degree that will be satisfactory to the operating forces and the travelling public. After coordination of police and maintenance patrol districts, crossovers should be placed at section limits, at locations where snow and ice control trucks need to reverse direction, and to care for wrecking, fire department, ambulance, etc. services. Usually crossovers are needed at each end of an interchange area so snow and ice equipment may reverse direction quickly to clear all entrance and exit ramps.

Extraordinarily wide medians with topography or vegetation between that obscures vision from one roadway to the other present operating problems to patrol and policing personnel which require consideration. Crossovers at each end of such medians are needed to permit "loop" operations by personnel for observation to detect broken down motorists, accidents or criminal operations. If "obscured view" medians are of considerable length intermediate crossovers will be required.

Crossovers should be inconspicuous as possible to prevent use by the public, paved suitably and with adequate drainage and other design features so maintenance costs are not excessive. For enforcement purposes signs prohibiting public use are required, such as "NO U-TURN — FOR OFFICIAL USE ONLY."

Between interchanges, emergency "escape hatches" are required at appropriate locations to care for entry and exit emergency vehicles but where public entry is not desired. Emergency entrances are life savers when disaster strikes. These ramp points of modest and rudimentary design are located strategically to the local road system, fire departments, ambulance service, local police stations, garages, wrecking and towing services. In order to prevent unlawful entry into a controlled access facility, the ramps may be fitted with locked gates and keys distributed to dependable and responsible personnel. In addition to prompt entry of ambulance, fire, towing, garage and police vehicles, it may be necessary to by-pass maintenance and police around trouble spots where large numbers of vehicles are stalled in spectacular accidents or in unusual blizzards. Often motorists and truckers will abandon vehicles in the roadway, thus blocking all movement and it is necessary to get to the head of the line quickly and pull stalled vehicles off the roadway.

Special features may be required on long viaducts where adjacent development precludes plowing snow over the side. Many such viaducts require the snow to be loaded on trucks and carted away.

Rest areas are important and add appreciably to the safety and comfort of the public. Sleepy and tired drivers need to pull off the highway for rest and sleep. Other motorists desire to eat a packed lunch and relax during the journey. Rest areas fill a real public need. They should be set back from the highway preferably with shade trees, picnic tables, public telephones and comfort facilities. Fencing may be required to prevent small children from venturing on to the adjacent main roadway. Importantly, acceleration and deceleration lanes are required for exit and entry to the highway.

Bus stations set off to one side with adjacent parking yards contiguous to the street system will be necessary on many portions of controlled access highways. They must be equipped with acceleration and deceleration lanes. Unless mass transit is encouraged it will not be possible for highway facilities to meet peak hour morning and evening demand.

Pedestrians do not comprehend the hazard of crossing wide modern highways nor do they have sufficient perspective to judge the speed of approaching vehicles. At locations where pedestrians will cross regardless of regulation but where a grade separated vehicular crossing is not justified, overhead pedestrian bridges provide a solution. These structures may be light structures, possibly of suspension design with open floor to avoid snow loading and icing hazards. In urban areas it may be necessary to enclose the crossing with wire mesh to prevent stones being thrown at vehicles passing below. Where feasible such bridges should have ramp approaches, not steeper than 10% gradient, rather than steps. The public is very loath to use steps and will often cross the road at grade rather than use stairs.

Bridge railings in urban areas have been the occasion of unfortunate public debate particularly when popular emotion reaches a high pitch. Highway authorities in an effort to design sightly structures aesthetically pleasing to the public have at times produced a railing that parents believe is hazardous to small children. Rails with openings that toddlers can crawl through or roll under and older children can walk on have been the subject of attack.

Right-of-way fencing to define the limits of public property, prevent unlawful entry and stop stock from straying on the highway is receiving attention. Generally farm type fencing is adequate. In urban areas where children are present, the chain link type may be required and in special cases 6 foot to 8 foot chain link surmounted by barbed wire may be necessary. At deer runs, fence 12 or more feet in height is required and in some cases underpass culverts may be needed to allow the deer to cross. Deer are becoming so numerous in the United States that the situation presents a problem due to the serious accident potential.

Utility crossings present another problem calling for mutual cooperation and planning between utility owners and the highway department. Such crossings should be planned so it will be unnecessary for utility employees to work within the highway right-of-way after the initial installation. The hazards to these employees and the public are so great after the highway is opened to traffic that full cooperation should be assured. Underground crossings can be put through in outer sleeves. In cases of breakage or need for replacement, the utility line can be withdrawn from the sleeve while working outside the right-of-way.

During the initial construction sufficient right-of-way should be purchased for interchange expansion. Never will property be any cheaper than at that time and it is surprising how quickly traffic expands to the point where additional facilities are needed. This also applies to right-of-way required for future widening operations.

Maintenance

Maintenance on an expressway is different from that on local rural roads, not only because of heavier traffic volume and high speed operation but due primarily to the attitude of drivers utilizing the facility. They feel they have the "right of way" and are intolerant of any operations on or occupancy of the roadway. Density and high speed have intensified the necessity for designing maintenance into the modern expressway so as to reduce occupancy of the roadbed by men and equipment. Full mechanization is necessary not only for efficiency of operations and conservation of labor but also to promote public safety. Machines, when equipped properly and operated carefully, reduce hazards of maintenance. Thus, it is necessary to take a fresh look at maintenance procedures, devising and employing special measures when performing maintenance operations on controlled access roadways.

Each maintenance task should be analyzed to determine whether the work can be effectively done by machine or other mechanical equipment. For example, ice control chemicals and abrasives can be handled by one-man operated special-body trucks, equipped with mechanical spreaders under control of the driver. These units can be organized to insure quick action necessitated by the high degree of service required on modern highways and assure top efficiency. The trucks can be loaded in eight to ten minutes by mechanical loaders or by overhead storage bins.

Where standard commercial equipment is not available on the market for particular tasks, special equipment can be developed in cooperation with reliable and experienced manufacturers.

Preventive maintenance, to as great a degree as feasible, must be designed into the modern expressway. High quality, tough and durable pavement that requires a minimum of surface maintenance is desired, and hard-surfaced shoulders flanked by adequate grass-covered berms eliminate the necessity of scraping and blading. This increases safety to the motorist who must drive onto the shoulder at high speed and also because of elimination of men and equipment working on the shoulders at frequent intervals. Open ditches should be eliminated and except in rock or mountainous country, side slopes that are to be mowed should be no steeper than 3:1 with all "breaks" rounded. Erosion control assumes important proportions on the large areas involved in trunk highway construction. All slopes and disturbed areas should be planted with grass seed and clearing carried back sufficiently to avoid falling trees encroaching on the travel lanes. All slopes and grading at drainage structures should be streamlined not only for increased vehicle safety but to facilitate the movement of grass-mowing machinery. Drainage pipe systems including inlets, designed on the self-cleaning principle with a minimum velocity of 3 feet per second when flowing one third full, will reduce maintenance. Liberal use of underdrainage to keep the water table down is of great importance, particularly in wide medians where so much water percolates underground.

All maintenance operations conducted within the roadbed from shoulder to shoulder must be surrounded by safeguards to reduce the chance of accidents to the absolute minimum, particularly those involving the public. Large signs repeated at regular intervals and traffic cones are used to mark every operation; and flagman protection is essential. Elaborate set-up and flagging service cost money but they are well worth while when viewed from the standpoint of public safety.

The "following truck" principle is utilized while applying traffic paint lines, work within the roadway areas and when mowing grass on narrow medians. For example, a typical set up is as follows. All pavement traffic paint lines possible are placed with a large truck applicator. Following immediately behind the applicator is the supervisor's truck and behind that is a truck placing traffic cones, at 50 foot intervals. This truck has an 8′x3′ "CAUTION MEN WORKING" sign. At the beginning of the operation where the paint has dried is a fourth truck on which is mounted an 8′x6′ sign with letters ranging from 12″ to 20″ high with the message "SLOW-KEEP OFF WHITE LINE—KEEP RIGHT (OR LEFT)—35 m.p.h." In addition the two preceding signs have red flashing blinkers mounted on them. At the very beginning of the entire operation is a stationary sign 6′x4′ with 10″ letters reading "SINGLE LANE—4 MILES."

These trucks and signs following the paint truck not only protect the crew

on the paint truck but importantly, reduce the chances of rear end collisions even in the case of somnolent drivers since the attention getting signs are visible for approximately a mile ahead. Work on the pavement on dense traffic routes usually can not be started until about 9 A.M. and must usually terminate by 4 P.M., otherwise traffic tie-up would be intolerable. If work is attempted beyond those hours more traffic than can be handled by the restricted roadway causes back up and stoppage of vehicles. This back up of stationary vehicles is an invitation to rear-end collisions.

There is evidence of motorists who continue driving on the road after reaching exhaustion and who drive in a state of somnolence, often actually dozing at the wheel. Although police are constantly on the alert for these drivers, nevertheless enough of them remain undetected to be a menace. Therefore, maintenance operations must be planned and safeguards set up in anticipation that a driver may drive straight into a stopped vehicle, sign or other object in the road. Flagmen, for example, must stand clear of signs and barricades since they would be endangered by flying pieces and they must always stand facing traffic, watching each approaching vehicle, constantly on the alert.

All operations on the modern highway should be conducted under the policy that the safety and comfort of the motorist comes first and maintenance and construction must be second.

It goes without saying that snow and ice removal operations must be prompt and so organized that no more than an inch or two of snow is allowed to accumulate. High speed plows, painted for maximum visibility under murky conditions and equipped with powerful jumbo-sized flashing red lights, usually operate in echelon, "floating" in the traffic stream. A special set up is needed at interchanges for prompt snow and ice control. An interchange plugged with stalled or stuck vehicles during an ice or snow storm can cause an emergency of vast proportions.

U.S. weather and airport weather reports are utilized extensively to give the maintenance man a "jump" on the weather. Today more and more states are employing specialized, personalized, professional weather services. A foolproof system of dissemination is essential. Many states have arrangements with commercial radio stations as a public service to broadcast adverse weather and road conditions. This adds immeasurably to the convenience and safety of the public.

Conclusion

Highway transportation is entering a new era in which operations will assume new and challenging proportions. Exciting and rewarding days are ahead not only in the field of design and construction but also in operations and administration. The new tasks and responsibilities generated by the expressway may seem burdensome but when viewed from the standpoint of public service involving the comfort and safety of the travelling public, they are eminently worth while. These developments should be welcomed, not feared, since they demonstrate the dynamic character and maturity of highway transportation. Particularly, there is deep satisfaction in the reduction of injury and death on the highway. Adequate designs and alert operation and administration will result in accident reduction as evidenced on an eastern turnpike where in 1956 the fatality rate was 2.3 per 100 million vehicle miles compared with the national rate of about 6.0, and an accident rate of 93½ which is 6 per cent of the national rate.

Appendix A

Facilities on toll highways must be self-liquidating as well as give essential service to the public. Two methods of development have been used:

(a) The turnpike agency obtains bids from prospective operators on the basis of the agency purchasing the ground for sites but with the operator developing these sites with paving, acceleration and deceleration lanes, etc. and constructing the buildings with his own funds. In these cases, a single firm often contracts to operate both gasoline and food facilities.

(b) The agency obtains separate bids for gasoline and food with the Agency furnishing site and buildings.

When the operator furnishes buildings and site development, stipulation is usually made that the design and appearance shall be subject to the approval of the owning agency and that the investment shall be amortized over a period of years at the expiration of which all facilities become the property of the agency. Contracts usually run for a set term of years with renewal or readvertisement at the option of the agency. Prices are usually required to be no higher than charged on parallel open highways. In addition to fuel, a line of tires and on-the-road accessories are usually carried for the convenience of the public.

When the turnpike authority provides the site and all other facilities except silverware, dishes and movable accessories, the specifications accompanying the call for bids spell out the working arrangement between the agency and the operators concerning maintenance, repair, renewal, redecoration, fuel, electricity, operation of heating, air conditioning plants, wells, water purification plants, sewage purification plants, snow removal, etc.

Service facilities require careful design based on handling large numbers of people on a 24-hour, round the clock, 365 days per year schedule. Some idea of the scope of the problem may be gained when it is realized ten service areas along the turnpike have served 11,000,000 meals and sold 18,000,000 gallons of gasoline a year. Mediocre facilities can not handle such patronage.

A service area should be located on ample ground (22½ acres is none too large) suitably landscaped, set well back from the highway and equipped with acceleration and deceleration lanes. Adequate sight distance and avoidance of adverse grades and alignment are important factors in site selection.

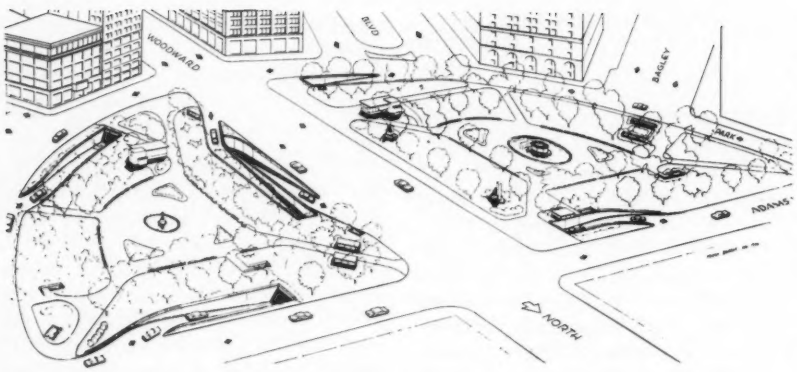
On the turnpike there are 145 restaurant seats and lunch counter seats and 23 motor fuel pumps for each 100 million vehicle miles of travel. There is one meal served and 1.8 gallons of gasoline purveyed per 100 vehicle miles of travel. About one third the gasoline used in travelling the turnpike is sold at the service areas. In 1958 after completion of new facilities and based on estimated traffic there will be 123 restaurant seats and 22 motor fuel pumps for each 100 million vehicle miles of travel.* These figures should be used with care since this is an urban state and many motorists are served locally and not on the turnpike.

The actual operation of the facilities is conducted on a lease basis by private enterprise specializing in the field.

*Increased traffic causes drop in rate.

The Parking Problem - Detroit Finds an Answer

by Ron Hall



Architect's drawing shows how new 1,000-car garage fits snugly under the downtown park. Patrons will be able to park their cars themselves.

I'M NOT GOING downtown. You have to drive all over the city to find a place to park. When you finally do, it costs you a small fortune and then you walk a mile to get to where you want to go."

Comment such as this has filled the air in America's cities, both large and small, ever since the auto industry went into mass production. It points up one of the country's biggest problems—how to provide adequate parking.

One of the cities hardest hit and one of the first to find an answer was quite naturally the center of automotive production—Detroit.

The Motor City was literally bulging at the seams with cars, with over 150,000 pouring into the central business district every day. First would come the all-day parker hurrying to his downtown store or office. Then came the shopper looking for a place to leave her car for two or three hours. And always there was the errand parker needing space for an hour or less.

Reprinted from *Motor News*, June 1957.

Detroit had parking spaces, some 1,400 at the curb and thousands more in dozens of private parking lots sprinkled throughout the business district. But there was never enough room. The question—how to find it?

Detroit's answer—make room. Clear out areas of low-standard buildings on the fringe of the central area and in neighborhood centers. Where present lots already stand, expand the space by building multi-level garages. Where new civic structures are being built, include parking arrangements in the planning, underneath or on the roof. Where a park or boulevard now stands, dig under it.

The most dramatic proof of the success of the Detroit venture comes early this month with the opening of the first section of the newest parking addition under Grand Circus Park. Like an oasis in the desert, this bright bit of greenery is nearly sacred to hot and footsore Detroiters during muggy days of summer. Anyone who suggested that it be replaced by a parking lot stood a good chance of being stoned in the streets, but a temporary upheaval while a new parking garage was built underneath alarmed Detroiters not a bit. Builders promised faithfully that the park would be restored as near to its original state as possible, and the progressive, unusual idea appealed to the majority of the downtown citizenry.

Smack in the middle of the business area, the new facility, constructed at a cost of $4,100,000, offers space for 1,000 cars. It was privately financed under a 25-year lease by H. K. Ferguson Co. Inc., Cleveland engineers and builders. The city will receive a guarantee of at least $25,000 a year from operating revenue and will retain control over rates.

Charges are modest in comparison with many other lots in the downtown area, starting at 35 cents for the first hour, with each additional hour at 25 cents. Maximum daytime rate is $1.50. Sundays and holidays it is 60 cents.

The new structure is the third downtown municipal garage to be opened this year. A 587-car multiple facility was opened in January at Second and Howard, just a few short blocks from the downtown terminal of Detroit's expressways. The next month a 700-car underground garage started business under the new Ford Auditorium in the Civic Center.

Eight municipal lots, built in neighborhood shopping centers, offer 1,715 spaces. Cost was $1,695,000. Two additional neighborhood lots will open this summer to handle another 152 cars, while plans are being formulated for another downtown area deck garage near an expressway exit. Plans for the huge Convention Hall and Exhibits Building, now under construction, call for another 2,850 spaces.

So, in just three years, the city has nearly 8,000 new parking spaces. With a high rate of turnover, they may easily handle two or three times that

number of cars in an average day.

Automobile Club of Michigan recognized the need for municipal action on off-street parking early in the 1940s and threw its weight behind all constructive proposals. Motor News carried numerous articles dealing with the parking problem and suggestions for its solution. The Club concluded and still believes that private interests should be given every opportunity to remedy the situation, but where they fail to do so or are unwilling to try, the public must be served through its official bodies.

Disgusted with the parking offered, citizens voted authorization for the city to get into the parking business in a 1941 election. In 1945, an advisory vote on an underground parking garage in the central business district found 82 percent of the ballots marked yes. Three years later, the Municipal Parking Authority was created by ordinance.

With commission status, the authority has powers to operate municipal parking facilities and to make recommendations to the mayor and City Council. It is headed by a four-man unpaid commission and is not an independent corporation.

Within a few months after its organization, the Authority had a plan and program for providing parking for both the central business district and major outlying centers. The first step was to prepare an ordinance providing for certain projects to be financed by revenue bonds supported by parking meter receipts.

But then the trouble began, culminating in the biggest tangle of lawsuits imaginable. Finally in 1950, with no parking areas even started, the city appealed directly to the Michigan Supreme Court for relief from nuisance suits aimed at preventing the city from supplying public parking.

With public patience growing short with the tactics of parking lot operators, Auto Club intervened in the suit on the side of the city, filing a separate brief on behalf of members. Five civic associations also received permission from the Supreme Court to enter the suit as Friend of the Court.

Excerpts from the briefs they filed in the case clearly show their appraisal of the facts and their determination to aid the city in providing off-street parking:

"This action climaxes a long series of battles by organized parking lot interests in Detroit to stop the City of Detroit from solving one of the biggest problems in its history—the regulation of traffic and parking in this great metropolitan center. Back of the filing of the present Bill of Complaint lie years of bitter and unrelenting opposition from private parking lot operators—usually behind the scene masking their interest by some 'taxpayer.'

". . . Nor has the fight been confined to the legislative and executive branches of the state and local government. Several major engagements in the courts have had the active and enthusiastic support of private parking interests. Each legal point has been won after a last-ditch fight in this court of last resort.

"The time has come to turn attention to realities. The automobile is a boon to mankind in widening the horizon of transportation. But it has also brought a terrific problem of life and death in handling traffic. Our generation has ceased to marvel at its utilitarian use, but is calculating how to handle traffic so that men can live and work together in great urban centers. The problem is not a cheap, narrow or petty matter of quarreling over how much profit can be wrung out of the hands of automobile owners for parking their automobiles, but rather—how can the overriding public interest be best served."

After reviewing the facts, the Michigan Supreme Court granted the city the relief for which it had petitioned and ordered a lower court not to try the latest law suit. Further delay was avoided when the U. S. Supreme Court refused to review the case, and at long last the city was free of lawsuits.

Now a new campaign was started in a last attempt to stop municipal parking from going ahead. Fantastic rumors began to circulate through the city. One of them—"If an underground parking garage were built in a certain area, an underground stream would cause it to sink in quicksand in five years."

Seeking to end the misinformation concerning parking and to bring out the truth, Auto Club joined with

(Continued on page 516)

In a neighborhood shopping center, this lot increased business and hiked property values.

Just a short distance from expressway terminal, this multi-deck garage opened early this year.

Performance Budgeting for Traffic Engineers

by Dave Beers
Administrative Interne
and
John T. Hanna
(Mem., ITE)
Assistant Director of Public Safety,
Richmond, Virginia

HOW MANY TRAFFIC SIGNS were installed in your city last year? What does it cost to maintain a parking meter for a year? How much do you spend for each parking space in your city?

Sound far-fetched? Well, not to the taxpayer who wants to know; and in Richmond, Virginia, he can find out. All of these and many other kinds of information are obtainable from what is known as a "program" or "performance" budget.

Instead of budgeting by "lump sum" amounts for electricity, personnel, supplies and materials as in the traditional "line-item" budget, the performance budget is based on the cost of complete programs. For example, Traffic Sign Installation and Maintenance is considered a complete program. All costs connected with the operation of that program are totaled on a single sheet, along with a description of the program itself. (See Fig. 1.) This list includes the total cost of salaries for all employees in the traffic signal program. Supplies and materials, maintenance and replacement of equipment, new equipment, rents and utilities, and freight and hauling costs are also listed individually and then totaled at the foot of the page. From

City of Richmond, Virginia

BUDGET - FISCAL YEAR 1956-57

BUREAU OF TRAFFIC ENGINEERING — DEPARTMENT OF PUBLIC SAFETY

Traffic Sign Installation and Maintenance
(Acct. #260702)

On 985 miles of City streets and public alleys, this program regularly provides for the preparation, installation, and maintenance of over 20,000 traffic regulatory signs, street name signs, highway route markers and all pavement markings, as well as historical markers.

A new five year "through street" program is provided for in the 1956-57 budget. This consists of signing all streets which intersect "through" streets designated by the Director of Public Safety.

PROGRAM STATISTICS	Actual 1954-55	Estimated 1955-56	Budget 1956-57
Signs installed and repaired	15,324	16,500	18,000
Average Cost	$ 6.35	$ 5.97	$ 6.09
EXPENDITURES BY WORK PROGRAM			
#260702. Traffic Sign Installation and Maintenance	$97,355	$98,550	$109,641
EXPENDITURES BY CHARACTER AND OBJECT			
Man-Years, Permanent Employment	16	15-7/12	16
Personal Services, Permanent	56,466	56,006	61,831
Supplies and Materials	35,141	35,545	40,874
Equipment, Maintenance and Replacement	2,760	6,700	4,815
Equipment, New	2,670		1,822
Rents and Utilities	310	299	299
Printing and Binding	8		
Total	$97,355	$98,550	$109,641

Figure 1

this list a total cost for the traffic sign program is determined.

Once the total cost for the program has been established, it is an easy matter to calculate an average unit cost for each sign installation in the city. Richmond's figures indicated that 15,324 traffic signs were installed or repaired during the fiscal year, costing an average of $6.35 each.

What advantages does this type of budget offer beyond satisfying curious taxpayers? For one thing, it assists the Councilmen by giving a clear picture of what work is being performed in the administration and how much that work is costing. Secondly, it provides the chief executive with a basis of accounting and control which is directly related to each of the city's many services. Perhaps most important of all, it enables the responsible operating official to review his own program and to justify budget requests for that program.

Suppose, now, that we take the $6.35 "unit cost" for traffic signs mentioned above in the 1956-57 budget. Assume that there has been no cost change for any element of the traffic sign program

City of Richmond, Virginia

BUDGET - FISCAL YEAR 1956-57

BUREAU OF TRAFFIC ENGINEERING — DEPARTMENT OF PUBLIC SAFETY

DESCRIPTION	EXPENDITURES Actual Fiscal Yr. 1954-55	Estimate Fiscal Year 1955-56	Budget Fiscal Yr. 1956-57
GENERAL FUND			
Annual Appropriation	$167,000	$225,500	$262,000
Total GENERAL FUND Appropriation	167,000	225,500	262,000
Less: Unexpended Balance	2,009	149	—
Net Total GENERAL FUND Expenditures	$164,991	$225,351	$262,000
EXPENDITURES BY WORK PROGRAM			
#260701. Traffic Research, Engineering and Education	$ 28,019	$ 26,555	$ 36,041
#260702. Traffic Sign Installation and Maintenance	97,355	98,550	109,641
#260703. Parking Meter System	36,959	41,123	42,826
#260704. Off-Street Parking Facilities	2,658	3,411	4,290
#260705. Traffic Signal Operation and Maintenance	—	55,712	69,202
Total	$164,991	$225,351	$262,000
EXPENDITURES BY CHARACTER AND OBJECT			
Man-Years, Permanent Employment	25	31-10/12	35
Personal Services, Permanent	$ 89,913	$120,962	$139,853
Supplies and Materials	39,054	42,442	48,102
Equipment, Maintenance and Replacement	17,855	22,850	28,080
Equipment, New	12,973	24,881	30,382
Rents and Utilities	1,665	12,523	13,838
Printing and Binding	294	69	65
Travel	214	430	600
Freight, Express and Hauling	—	8	—
Other Contractural Services	3,000	1,104	1,000
Unclassified	23	82	80
Total	$164,991	$225,351	$262,000
CAPITAL FUND			
4. Traffic Controls			
Unencumbered Balance (Beginning of Year)	$ 49,524	$ 88,226	$ —
Funds Made Available	150,500	251,800	—
Total Available for Expenditures	$200,024	$340,026	$ —
Unencumbered Balance (End of Year)	95,524	69,222	—
Total CAPITAL FUND Expenditures	$104,500	$270,804	$ —

Figure 2

for the entire year—such as increased salaries or more expensive supplies. Assume further that no additional installations were made during the year—an ideal situation to be sure. But as the administrator makes out his budget for the coming year, he discovers that he will be able to operate with a lower unit cost than that of the previous year — say $6.21. Taking our conditions above as given, this decrease would usually indicate greater efficiency somewhere in the operation itself. It could also mean that some phase of the operation is being neglected. However, it represents a change since the previous year's performance. This additional information helps the official to review conditions in his own area.

How is the performance budget prepared? At this point we should indicate that Richmond uses two separate budget documents. One of these is a Capital Improvements Budget which extends over a five year period. The operational or perfomance budget is the annual document by which appropriations are made for the services—or programs—themselves. This budget is prepared over a period anywhere from five to eight months in duration in much the same manner as any normal budget is processed.

A rough draft is submitted to the departmental director from each bureau chief. The director's office consolidates and reviews these estimates, makes whatever alterations may be necessary, and then sends them on to the city manager (budget officer). Following analysis at that level, the overall city budget is finally forwarded to the City Council for review, public hearing, and eventual enactment. The capital improvement budget (for such things as new streets or buildings) goes through much the same process except that it goes to the City Planning Commission for review and approval prior to final submission to the City Council.

In the completed budget document, each program is coded with a number for puposes of accounting and overall convenience. For example, account No. 260702 indicates the traffic sign program of the Bureau of Traffic Engineering. The first two numbers—26—designate the department, which is Public Safety in this case. The next two digits—07—stand for the bureau, and the final two numbers indicate which progam.

Following the basic code number is a three digit decimal series to indicate expenditures by character. Thus .101 stands for salaries, .201 for supplies and materials, and so on. Instead of writing out the cost of personnel for the traffic sign program of the Bureau of Traffic Engineering in the Department of Public Safety, we simply use the shorthand method of 260702.101.

Once each separate work program has been defined and it has been determined which costs properly belong to that program, the hardest part about setting up a performance type budget has been completed. From that point on, the budget is similar in operation to any other type of budget, although this one offers what we believe to be greater advantages.

A summary is prepared showing totals for the various programs. Thus a total for the Bureau of Traffic Engineering is available. (See Fig. 2.)

Transfer of funds is allowed from one program to another within the same department at the request of the department head. This can be done any time during the year if approval is secured from the city manager. But transfers from one department to another can be done only during the fourth quarter of the year, and then only by ordinance passed by the City Council. All appropriations are divided into quarterly allotments for control purposes. Unexpended funds, such as for personnel vacancies, are transferred to a general contingency fund for the balance of the fiscal period.

Basically, the great advantage of the performance type budget is that it clearly defines costs in terms of services. As a by-product of this division, it is possible to obtain much more detailed information than can be found from the usually "character" type budget. The additional work necessary to establish the performance budget has been more than outweighed by the advantages to our elective, administrative, and operating officials—and to the public which they serve.

PARKING PROBLEM ANSWER

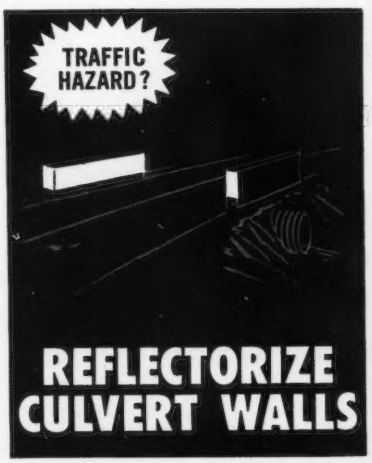
(Continued from page 513)

Mayor Cobo, Downtown Property Owners' Association and the parking authority in calling a public meeting. With 185 civic leaders in attendance, the meeting was a marked success and with complete newspaper, radio and television coverage soon silenced all such rumors.

Freed at last of its many burdens, the parking authority sprang quickly into action. Under the direction of John D. McGillis, an energetic, tireless and dedicated public servant who formerly was a deputy director of the War Production Board, plans were rapidly completed and work started. While the problem is still not fully solved, progress in three years amounts to at least a minor miracle.

Other plans are being readied and further studies made. When private interests will accept the responsibility of providing parking in areas where it is needed, the parking authority will step aside and shift its interests elsewhere.

Private lots are still doing a good business and millions of citizens and visitors to Detroit are enjoying the benefiits of a sound parking program. Every new parking space is a fitting tribute to the inspired teamwork of the hundreds of individuals and dozens of organizations that made them possible.



. . . FOR 17¢ A SQUARE FOOT

Fast, one-step reflectorization as easy as painting! Hazards reflectorized with 3M's "Codit" Liquid flash brilliant warning at night for safety. Treatment costs a low 17¢ per square foot. Buy supply from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minnesota.

Get "Codit" Reflective Liquid in 6 oz. aerosol spray or 4 lb. can or complete safety kit.

3M

Traffic News

NSPE Surveys Career Satisfactions Among Engineers

Engineers must change their attitudes if they are to become good managers; opportunity for advancement and the chance to do creative work are rated as the most important job factors by engineers in the industry; and three-fourths of the engineers in industry feel their education was deficient in certain areas.—

These are some of the highlights in a survey on "Career Satisfactions of Professional Engineers in Industry" which was presented at a conference on professional development of young engineers at the recent annual meeting of NSPE in Dallas, Texas.

The survey is the latest in a series of executive research reports made under the sponsorship of the Professional Engineers Conference Board for Industry in co-operation with NSPE.

Conducted by the Opinion Research Corporation, Princeton, New Jersey, the report is based on personal interviews with 265 professional engineers employed in industry throughout the country. The detailed "depth" interviews were designed to bring out the non-salary career satisfaction of engineers at three stages of professional experience—3 to 6 years, 10 to 15 years, and 20 to 25 years.

The survey questions centered around such things as the engineer outside of his work, the career outlook of professional engineers, satisfaction and frustration on the job, the question of professional status, and the differences in values of the more successful engineers.

The survey indicated that the engineers in the company hierarchy view themselves as superior to the accounting, personnel, public relations and advertising branches. However, appreciable numbers feel that the engineer is accorded less importance than the production and sales departments.

Sixty-seven per cent of the engineers in the 3-to-6-years-experience group stated that there were things lacking in the college training they received, and approximately 76 per cent of those with more experience felt that there were deficiencies in their college training.

Topping the list of company sponsored training courses that the engineers said would be most profitable to them were: organization and planning, how to supervise, and how to handle people.

The survey found that well over half of the engineers in all three experience-level groups think that engineering is not recognized as a profession by the general public.

The survey also found that the most skepticism about the opportunities for advancement in engineering was expressed by men in the lowest technical positions. The engineers interviewed for the survey indicated that sheer technical competence does not receive the same tangible rewards for successful performance that are available in other positions.

—from NSPE *Engineering Employment Practices Newsletter*, July 1957.

Governor's Conference Adopts Highway Safety Resolutions

The Governor's Conference, meeting June 26 at Williamsburg, Virginia adopted a strong resolution on highway safety.

The resolution is as follows:

WHEREAS, during the first year of its operation, the Governors' Conference Committee on Highway Safety has provided all of the states valuable information and assistance in the development of effective programs for the reduction of death and injury on public highways; and

WHEREAS, as a direct result of this effort, many important forward strides already have been made in traffic safety legislation, administration and enforcement; and

WHEREAS, despite these encouraging gains, there still is a most urgent need to reduce the carnage on streets and highways which, unless checked, will claim half a million lives during the next decade:

NOW THEREFORE BE IT RESOLVED, by the Forty-ninth Annual Meeting of the Governor's Conference, that the Committee on Highway Safety be continued in existence, with the request that it also seek to develop recommendations for legislation requiring safety design features to be incorporated as standard equipment on all new automobiles; and

BE IT FURTHER RESOLVED, that this Conference express appreciation to the Committee for its fruitful work in this vital field, and pledge continued cooperation and support during the next year.

Off-Street Parking Workshop Scheduled For Milwaukee Sept. 30 - Oct. 1

The Second International Workshop Meeting on Off-Street Parking will be held in Milwaukee on Monday, September 30 and Tuesday, October 1.

The first meeting was held in Detroit last year. This meeting, sponsored by the American Municipal Association Committee on Parking and the Milwaukee Parking Commission, is open to city officials, executives, technicians and engineers.

The technical sessions will include discussions of location, size, layout, construction, operation, maintenance, financing, administration and policy making. Field trips are planned to view 23 facilities in operation in Milwaukee.

For more information, address Martin E. Bruening, Traffic Engineer and Superintendent, Bureau of Traffic Engineering, City Hall, Milwaukee 2, Wisconsin.

Lighting Engineers Penetrate Fog for First Time

Lighting engineers satisfactorily pentrated fog with automotive and highway-lighting equipment for the first time in a demonstration at the Pennsylvania State University late in June. This is believed to be the first major breakthrough in close to 100 years of scientific research to pierce the fog barrier.

The tests showed, according to Charles R. Marsh, associate professor of electrical engineering at the Pennsylvania State University, that it will

be possible to increase visibility in fog on the open highway by 100 per cent or even more through light control within the next year and that "we are already apparently approaching this level."

The demonstration, in which Professor Marsh participated, showed that changing the mounting angles of highway lighting, using low-mounted white fog lights, and polarizing the light sources can successfully accomplish a major improvement in visibility in fog.

The tests presented the latest results in a series of studies begun three-and-a-half years ago by the Illuminating Engineering Research Institute at the request of the turnpike authorities in an effort to reduce the number of fatal and near-fatal accidents on the nation's highways.

It is also expected that the studies might develop a formula through which turnpike authorities could determine when to close their limited-access highways and when to order reduced speeds, both in the interests of safety, and when to continue operations during fog periods in the interests of public service.

Fog a Serious Accident Hazard

Fog accounted for approximately five per cent of all accidents on the New Jersey Turnpike during the first two-and-a-half years of its operation—a figure that is made more significant by the fact that a sizeable proportion of the accidents involved a number of vehicles, some as many as 26 cars. More than 65 per cent of the fog accidents occurred at night, and 82 per cent were of the rear-end type.

The problem is further compounded by the fact that fog is an almost equally serious accident hazard on all turnpikes and highways on the northeastern and northwestern seaboards of the United States and in the Great Lakes area, statistics show.

Two cooperating groups of scientists, both under the direction of the Illuminating Engineering Research Institute, penetrated man-made fog, which has identical characteristics of natural fog, in the revealing tests which were staged in a 50-foot Army-type medical tent. Three separate types of lighting control were exhibited, each producing a notable although varying effect in penetrating a controlled fog barrier. Fog created inside the tent was equivalent to approximately 50-foot visibility on an open highway.

Beams Cast Perpendicular to Pavement

In the first light-control method, overhead roadway lights were mounted so that their beams were cast perpendicularly to the pavement. In the second method, reflector floodlights were installed on the shoulder of the simulated road and slightly above the pavement level so that the beams fell across the roadway perpendicularly to the autoist's line of sight. In the third method, automobile headlights and fog lights were dropped below the bumper level of the average car and, for maximum effect, were polarized.

"Each of the three fog-penetrating systems demonstrated clearly proves that the fog barrier can be satisfactorily pierced when illumination is directed perpendicularly to the driver's line of sight or, in the case of auto headlights, as perpendicularly as possible," according to C. L. Crouch, technical director of the Illuminating Engineering Society and secretary of the Research Institute.

The realistic principle involved, Mr. Crouch explained, is that lighting, whether polarized or not, must be so arranged that the driver's line of sight does not travel along the beam of either his own headlights or of fixed highway lights.

"On the nation's highways, this recommended improvement can be achieved by altering the mounting angles of fixed road lights for fog conditions, by equipping cars with low-mounted headlights, or with equally low-mounted polarized fog lights—which could be used without other headlights in fog conditions—or by a combination of both methods," Mr. Crouch continued.

He likened polarization of light to the use of a haze filter on a camera. Just as a camera filter screens out certain colors to make a clearer view, so a polarizing filter screens out a certain portion of the light bounced back by fog and reveals a more distinct scene.

The addition of color to fog lamps, according to the lighting scientists conducting the studies, has been found to have little or no effect in increasing the degree of fog penetration.

Pieces of inexpensive polarizing material were used in the demonstration to filter the light sources. Maximum benefits were obtained when the resultant light was viewed through a similar filter mounted on a swing-away visor at the viewing point.

Training Opportunities

August 19-31—APPLICATION OF COMPUTERS TO HIGHWAY & TRAFFIC ENGINEERING—
Sponsored by Northwestern University Transportation Center and the Institute of Transportation and Traffic Engineering, University of California. For engineering or physical science graduates. At Evanston, Illinois. Tuition $150. For information, address: Dr. John E. McGrath, Transportation Center, Northwestern University, 1818 Hinman Ave., Evanston, Ill.

September 9-14 — HIGHWAY EXECUTIVE DEVELOPMENT CONFERENCE—
Sponsored jointly by AASHO and the National Highway Users Conference. By invitation only. At University of Wyoming, Laramie. For information, address: Mr. Roy E. Jorgensen, National Highway Users Conference, 966 National Press Bldg., Washington 4, D.C.

September 17-19—NATIONAL CONFERENCE ON INCREASING HIGHWAY ENGINEERING PRODUCTIVITY (4th of a series)—
Sponsored by AASHO, Association of Highway Officials of the North Atlantic States, Massachusetts Department of Public Works, M.I.T., and U. S. Bureau of Public Roads. All engineers, officials, consultants and others interested. At Somerset Hotel, Boston, Mass. For information, address: Mr. H. A. Radzikowski, U. S. Bureau of Public Roads, Washington 25, D.C.

September 23-27 — HIGHWAY MANAGEMENT TRAINING COURSE—
Sponsored by AASHO and the National Highway Users Conference. For highway engineers with some administrative experience who might be expected to devote some time to management training in their own departments. By invitation versity, Ithaca, N. Y. For information, address: Mr. Roy E. Jorgensen, National Highway Users Conference, 966 National to the department only. At Cornell Uni-Press Bldg., Washington 4, D.C.

PLAN
for
DETROIT
in
SEPTEMBER!

•

September 23-26, 1957
Statler Hotel, Detroit, Mich.

•

27th Annual Meeting, ITE

New Appointments

Governor Hodges and W. F. Babcock

Babcock Named North Carolina's First Director of Highways

Willard F. Babcock (Mem., ITE) has been named the first Director of Highways in North Carolina.

The appointment of Babcock was announced by Governor Hodges with the statement: "This is one of those rare occasions when the job actually did seek the man."

The General Assembly recently reorganized the highway commission, and Director Babcock becomes the chief executive of a 9,000-man department which will spend about $390-million in the next two years.

The new seven-man Commission is the policy-making body while the Director has the job of carrying out the policies adopted.

Babcock started at N. C. State College as an instructor in 1940. He rose to the position of assistant profesor of civil engineering in 1942, associate professor in 1947, and full professor in 1952. It was in 1948 that he began his practice as a consulting engineer in traffic and transportation engineering.

Since then, he has been the consultant to many North Carolina municipalities, including Apex, Asheboro, Black Mountain, Burlington, Carolina Beach, Chapel Hill, Durham, Fayetteville, Forest City, Goldsboro, Graham, Greensboro, Greenville, Henderson, High Point, Jacksonville, Kinston, Laurinburg, Lenoir, Madison, Marion, Mooresville, Morgantown, New Bern, Raleigh, Rocky Mount, Roxboro, Salisbury, Sanford, Smithfield, Stateville, Thomasville, Wallace, Washington, and Spartanburg, S. C.

Among the various honorary societies to which Babcock belongs is Chi Epsilon, the national scholastic fraternity in civil engineering. He was national president of the organization from 1954 to 1956.

In addition to the Institute of Traffic Engineers, he is a member of the American Society of Civil Engineers, the American Institute of Planners, the American Road Builders Association, and the N. C. Society of Engineers. He is a technical advisor to the National Committee on Urban Transportation.

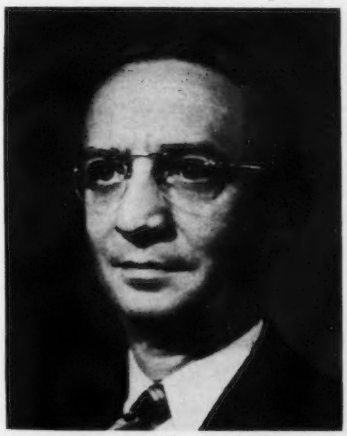
Under the new highway act, Babcock will serve a five-year term.

Based on his wide experience, Babcock commented that "the State and municipal governments are going to have to work together to solve rural and urban traffic and transportation problems for the mutual benefit of all."

Mackall Retires from Signal Firm After 42 Years of Service

Kenneth W. Mackall (Mem., ITE) retired July 15 after 42 years with Crouse-Hinds Company.

Mackall has been active in the development of traffic signal equipment and control systems since the problems of guiding large numbers of vehicular traffic first arose after World War I. After graduating from Virginia Polytechnic Institute, he joined General Electric in 1910. Five years later, he began work in Crouse-Hinds' sales department. In 1925, Mackall was named manager of the company's newly-formed traffic signal division, a branch of the business he largely had originated by designing the first traffic signal manufactured exclusively for directing street and highway traffic. He became a commercial vice president



Kenneth W. Mackall

in 1951. For over a decade he has been a prominent member of the International Municipal Signal Association and the Institute of Traffic Engineers.

Kenneth C. Eichelberg has been appointed manager of the traffic signal division, succeeding Mr. Mackall.

A veteran of 21 years in the Division he now heads, Eichelberg joined Crouse-Hinds a year after his graduation from Syracuse University. While

in college earning a degree in electrical engineering, he was a member of three honorary fraternities. He became assistant manager of the Traffic Signal Division in 1951. Currently, he is serving on the Institute of Traffic Engineer's committee on control of traffic signals for emergency vehicles.

Adrian H. Koert

Koert Assumes Des Moines TE Post

Adrian H. Koert (Assoc. Mem., ITE) has been appointed traffic engineer of Des Moines, Iowa.

Prior to this appointment, Koert was in the consulting field, having been employed for ten years by George W. Barton & Associates in Evanston, Illinois. During the years he spent with Barton, he made studies of traffic problems in cities, for private industry and in connection with the development of shopping centers.

Koert attended Calvin College in Grand Rapids, Michigan, and the University of Michigan, from which he received the degree of Bachelor of Science in Transportation Engineering in 1947.

Service experience included 3½ years in the Army Air Force as a weather forecaster, with the rank of 1st Lieutenant.

Chambliss Joins Staff of Sign Making Firm

Jack W. Chambliss (Mem., ITE) has accepted a position with National Safety Engineers, sign manufacturers of Birmingham, Alabama.

Chambliss has been for the past four years assistant traffic control and safety engineer for the Mississippi Highway Department. Prior to that he was with the City of Montgomery, Alabama.

A graduate of the University of Alabama, Chambliss attended the Yale Bureau of Highway Traffic in 1950-51.

Chambliss has been active in music since college days and has played with the Montgomery Symphony Orchestra. He has taken an active part in Institute affairs, and is currently an Associate Editor of the magazine.

Jack W. Chambliss

Shockey Leaves City of Denver for Sales Work

Jack Shockey (Jun. Mem., ITE) has been appointed sales engineer by AGA Division, Elastic Stop Nut Corporation.

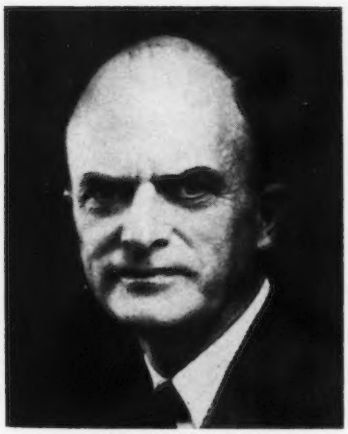
Jack Shockey

Shockey had been associate traffic engineer in Denver, where he had been employed since 1951. Previously he had worked for the Bureau of Public Roads on location in New Mexico.

A member of the Colorado Society of Engineers, Shockey has been a student of civil engineering at both the University of Denver and the University of Colorado.

Vey Leaves Safety Council for Consulting Field

Arnold H. Vey (Mem., ITE) has joined the staff of Simpson and Curtin, Transportation Engineers, of Philadelphia, where he will be principal traffic engineer and will have direct charge of all the firm's traffic engineering activities.



Arnold M. Vey

For the past two years, Vey has been manager of the Traffic and Transportation Department of the National Safety Council in Chicago. Prior to that, he had served for more than 20 years as state traffic engineer and Director of the Bureau of Traffic Safety of the State of New Jersey. Earlier, he had been employed by Parsons, Brickerhoff, Hall & Macdonald on traffic and transportation surveys.

During the war, Vey was commissioned as Colonel in the Transportation Corps, and served in the China-Burma-India theater at Ledo on the Burma Road as Chief, Plans & Control Division, S-3, and Commanding Officer, 468th MQ Truck Group.

Hunnicutt Becomes Manager of Nashville Parking Board

James M. Hunnicutt, Jr. (Assoc. Mem., ITE) has been appointed general manager of the Nashville Parking Board.

Hunnicutt had served for six years with the Bureau of Street Traffic and Parking in Chicago, where he was head of the Design and Field Divisions and did general public relations work. One of his last projects was the preparation of a report on the subject of hot rods and drag strips.

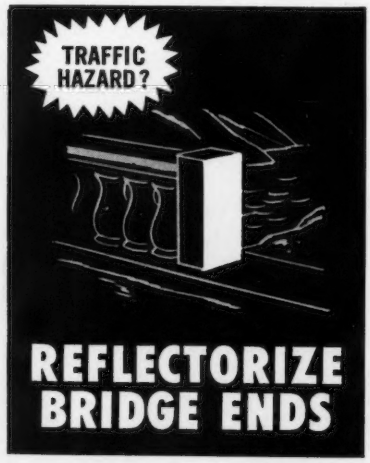
Prior to his Chicago duty, Hunnicutt worked with the Georgia Highway Department.

Born in Roanoke, Virginia, Hunnicutt received his B.S. degree from Alabama Polytechnic Institute, and attended the Yale Bureau of Highway Traffic in 1953-54.

James M. Hunnicutt

In 1945 and 1946, he served in the U.S. Navy on destroyer duty in the Pacific and the Atlantic.

In addition to his Institute of Traffic Engineers membership, he is a member of the Western Society of Engineers.



. . . FOR 17¢ A SQUARE FOOT

Fast, one-step reflectorization as easy as painting! Hazards reflectorized with 3M's "Codit" Liquid flash brilliant warning at night for safety. Treatment costs a low 17¢ per square foot. Buy supply from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minnesota.

Get "Codit" Reflective Liquid in 6 oz. aerosol spray or 4 lb. can or complete safety kit.

PRODUCT OF 3M COMPANY RESEARCH

Strictly Business

New Demonstration Roadway Lighting Facility Unveiled by General Electric

This "proving ground"—capable of simulating roadway lighting conditions anywhere in the world—has been unveiled at Hendersonville, N. C., by the General Electric Company. In this photo, the one-third mile road network is showered by light from more than 130 street lighting fixtures of 15 different types. The new test facility makes possible the demonstration of more than 30 different roadway lighting systems and will be used by engineers in their quest for improved street and highway lighting equipment to aid in reducing night hazards for motorists and pedestrians.

A demonstration roadway lighting facility where more than 30 different lighting combinations can be observed has been unveiled at General Electric's Outdoor Lighting Department—"the Outdoor Lighting Center of the World."

Although the demonstration streets measure less than one-third of a mile in total length, they offer opportunities for demonstrating the effects of virtually every combination of modern lighting that can currently be applied to America's roadways.

Joseph T. Bailey, general manager of the Outdoor Lighting Department, said it would be necessary for an individual to visit 25 to 30 different towns to see everything that can be seen at one time and in one spot at Hendersonville. "As far as we know, this is the only facility of its type anywhere in the world," he said. The demonstration streets are a part of General Electric's $500,000,000 program of expansion and modernization for the years 1956 through 1958.

The area is designed to provide practical demonstrations of all types of street lighting equipment on different types of pavement and on all major street classifications. Here users of street lighting equipment—municipal officials, state highway representatives, electric utility lighting engineers, and others—can compare and evaluate different light sources for a variety of applications.

General Electric will use this facility to conduct extensive studies, investigations, and research on how well the night driver actually sees under various roadway lighting systems. The area will also serve as a proving ground similar to those used by automobile manufacturers in that it will aid the company in developing improved equipment to help reduce night hazards for motorists and pedestrians.

A master control panel enables an operator to make rapid changes of lighting setups so viewers may compare effects of all three major light sources—filament, mercury, and fluorescent—on streets similar to those found in any community. Comparisons can be made of effects created by the newest, most modern luminaires and older lighting fixtures still in use on many American streets.

Provision has been made for testing the effect of all three major light sources on residential streets, traffic streets, main business streets, and whiteways varying in width from 25 to 70 feet. More than 130 luminaires of 15 different types are mounted on steel, aluminum, concrete and wood poles a variety of brackets. Both overhead and underground wiring is used and multiple and series circuit equipment is demonstrated.

Included in the demonstration area is a 100-foot stretch of parallel-to-roadway fluorescent street lighting—an experimental new system of roadway illumination under development by the Outdoor Lighting Department In addition, there is a demonstration of "T-lighting"—an offshoot of parallel lighting. General Electric engineers have mounted two Form 206S luminaires end-to-end and parallel to the curb at the base of a normally-mounted Form 406S unit to form the "T-lighting" configuration.

Approximately 175 state, municipal, and electric utility officials from throughout the nation—attending the annual Street and Highway Lighting Conference at Asheville and Hendersonville—witnessed the premier demonstration of the new facility.

New Aerial Platform Is Offered

An extensible personnel platform by Mobile Aerial Towers, Inc., Fort Wayne, Indiana, is now being offered.

Designed specifically for medium height municipal maintenance work, the Hi-Ranger Model 4-40CH may be mounted on most commercial vehicles, depending upon user requirements and specifications. Equipped with new Hi-Lift type adjustable outriggers, the Hi-Ranger is suitable for use on flat or rough terrain.

The 4-40CH is all-hydraulically actuated and controlled, deriving operating pressures from its accumulator type system, driven by the carrying vehicle's engine.

The manufacturer emphasizes application versatility with the 4-40CH. In heavily urban areas workers can elevate themselves to traffic or street lights for service operations without impeding traffic below. Outriggers, used primarily when the Hi-Ranger boom is to be extended laterally, lower axially from their cylinders rather than radially, extending only a few inches beyond the maximum width dimensions of the vehicle. Independent control of each outrigger permits leveling the truck even on sloping work sites.

Maximum work-level elevation of the 4-40CH is about 46 feet; the operator, in the completely insulated personnel basket, uses a single "3-D" control to reach quickly almost any point in a 40-foot radius.

Additional details and users list are available from the manufacturer, Mobile Aerial Towers, Inc., 1750 N. Harrison St., Fort Wayne, Indiana.

Chicago Awards Marking Paint Contract

A contract calling for 31,000 gallons of traffic marking paint has been awarded by the city of Chicago to Inter-Amco, sales agent for the Clinton Company, manufacturer of the paint.

Paint samples submitted by Inter-Amco for evaluation were based on Pliolite S-5, synthetic rubber resin produced by the Chemical Division of the Goodyear Tire and Rubber Company. Similar formulations submitted by Inter-Amco were selected for use by the city in 1955 and 1956. The 1957 contract, which covers both white and yellow marking paints, was awarded on the basis of competitive bids.

All traffic paint used by Chicago is tested both in the laboratory and in

actual across-the-road stripes. In making their selection, city engineers use a formula to determine the lowest cost per foot per day of useful life as the basis of the award.

This formula takes into consideration a number of factors, including cost of the paint and cost of application, linear coverage, and general performance rating after a given period of use.

Chicago requirements include both white and yellow stripes. All are beaded with a specified minimum of 3½ pounds of beads per gallon of paint. Five-inch stripes are used predominantly and are applied by roller or spray. Application begins in early Spring and continues through late Fall, depending upon the weather.

Baltimore Awards Largest Contract for Hot Plastic

The country's largest contract ever placed for hot plastic street-markings was recently awarded by the City of Baltimore to Veon Chemical Corporation of Long Island City, N. Y., manufacturer of PERMA-LINE.

Veon's contract calls for 500,000 feet of reflectorized four-inch lane stripes and center lines to be installed between July 15 and October 1, 1957. The thermo-compound, successfully tested by Baltimore in 1954, is to be applied in two colors—65 per cent white and 35 per cent yellow.

According to Henry A. Barnes, Commissioner of Transit and Traffic for Baltimore, the contract is the first part of a three-year program under which hot plastic will be used for every lane line on principal Baltimore arterial streets.

DETROIT'S SIGN SHOP

(Continued from page 508)

control device has won such widespread public acceptance as paint lines. This is a fact, because one of the first signs of spring in Detroit is the marked increase in citizen requests for the resumption of the street painting program.

Pavement marking materials of many types are manufactured at this time. Metal markers, plastic disks, plastic strips and liquid plastics have come into prominence in recent years as manufacturers attempt to develop a permanent marking material. The City of Detroit tests every new material that is introduced on the market, and currently five new types of materials are being tested in various sections of the city. We have found that all of these new materials have some advantages under certain field conditions but there are many problems of installation and maintenance that must be solved before they can supplant street marking paint.

At the present time, this department uses over 19,000 gallons of paint annually, as follows:

Location	Gallons
Intersections	4,000
Lane lines	8,000
Center lines	3,000
School crosswalks	650
Curbs	3,000
Parking meter stalls	400

The Traffic Sign Division operates three self-propelled laners, six crosswalks machines and two portable paint spray machines to do this work. Trucks with hydraulic tail gates have been acquired to enable crews to load and unload the paint machines very quickly when changing work locations. This equipment has resulted in increased efficiency of this operation in the last three years. The value that this department places on street paint may be seen by comparing 1940, when 3,500 gallons of street paint were used, with 1957.

Other Activities

In addition to the sign work and street painting discussed above, the sign shop is responsible for the maintenance of some 6,500 parking meters, which are scattered throughout the City of Detroit. This operation involves 13 field men and 3 shop men. Each field man has a specific route to check each day and he is wholly responsible for the operation and appearance of the meters in his district. He must keep careful records of all time and materials used in maintaining each meter so that a complete cost record is available. This information is valuable in comparing different types of meters when considering the purchase of additional equipment.

Another activity of the sign shop is the installation of safety posters at some 500 locations throughout the city. These posters are furnished by the Traffic Safety Association of Detroit. New messages are placed on the poster boards each month.

Summary

It should be pointed out that the old-time municipal sign shop, where a few signs were hand painted each day and installed by common labor, is a thing of the past. The type of plant required to serve present day requirements must be the result of careful engineering planning and must be operated in the same manner as any manufacturing plant. New traffic signs are becoming larger and pose structural problems in their installation. New materials are constantly being introduced and must be evaluated. All of these things indicate that this activity is an engineering function and this department has treated it as such by requiring the supervisor to have an educational background in engineering together with considerable experience with the problems of modern traffic engineering or management.

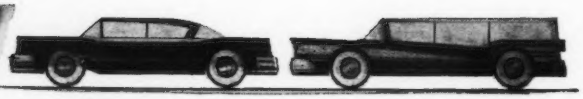
MOTOR VEHICLE DEATHS AND DEATH RATES

1955, 1956, and 1957

Month	1955	1956	1957	1955-57 Change	1956-57 Change
January	2,810	2,990	2,860	+ 2%	—4%
February	2,319	2,720	2,540	+10%	—7%
March	2,602	2,920	2,920	+12%	0%
April	2,753	2,930	2,930	+ 6%	0%
May	3,101	3,170	3,110	0%	—2%
Five Months	13,585	14,730	14,360	+ 6%	—3%
June	2,982	3,290			
July	3,350	3,570			
August	3,586	3,610			
September	3,446	3,710			
October	3,918	3,460			
November	3,559	3,690			
December	4,000	3,940			
Total	38,426	40,000			

All 1955 figures are from the National Office of Vital Statistics.
All others are National Safety Council estimates.

protecting the public... enforcing the laws...



with ELECTRO-MATIC. RADAR

The importance of law enforcement is being appreciated more and more by a public that expects protection to keep pace with the growing number of vehicles. The proper combination of realistic laws, strict enforcement, and modern equipment to help police and the courts do their jobs is an intelligent approach to the ever-increasing problem.

The Electro-Matic® Radar Speed Meter has become an indispensable instrument for both engineering and enforcement. It is used for speed studies to help establish up-to-date speed limits. Used for speed law enforcement, it provides a means of detecting and controlling speeders without hazard to pursuing officer or motorists. Accuracy and simplicity of usage are but two factors that have won the Electro-Matic Radar Speed Meter public, judicial, and legislative approval.

To discover how speed laws can be realistically established, and scientifically enforced, write for Bulletin R-112.

AUTOMATIC SIGNAL DIVISION

EASTERN INDUSTRIES, INC. NORWALK • CONNECTICUT

New Publications

The Federal Government's Stake in Adequate Highways In Peacetime and War.

National Highway Users Conference, 996 National Press Building, Washington 4, D. C., June 1957, 10 pp. (processed).

Section 210 of the 1956 Highway Act has focused attention on the benefits of highway systems, and this brief report analyzes the benefits to the public at the Federal level. It emphasizes that many of the factors have changed since previous Federal studies (1940 and 1944) and urges that a new and realistic look be taken at the present benefits of highways at the Federal level.

Urban Arterial Planning

Bulletin 153, Highway Research Board, 2101 Constitution Ave., Washington 25, D. C., May 1957, 43 pp., $0.90.

The three papers of this bulletin were presented at the 1956 Annual Meeting of the HRB as part of a session on urban traffic planning problems and methods.

The first, on "Directional Analysis of Vehicular Travel Desire," uses the Detroit Metropolitan Area traffic study as a basis for describing trip desire chart construction and applications.

The second, entitled "Directional Contour Maps of Travel Desire," uses the Dallas County (Tex.) origin-destination survey of 1950-51 to project travel desire data to 1980 and depict it graphically. Directional maps of both the contour and block types, and their applications to specific uses, are described.

The third paper describes the "Comprehensive Arterial Highway Plan for the Cleveland Metropolitan Area," from both the analysis and planning approaches.

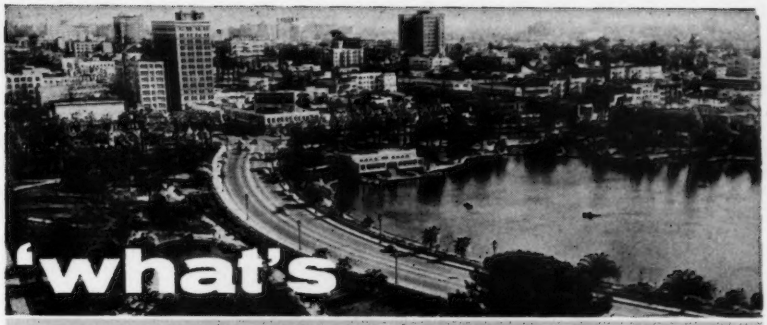
Traffic Speed and Volume Measurements

Bulletin 156, Highway Research Board, 2101 Constitution Ave., Washington 25, D. C., May 1957, 44 pp., $0.90.

The three papers contained in this bulletin were presented at the 35th Annual Meeting of the Highway Research Board.

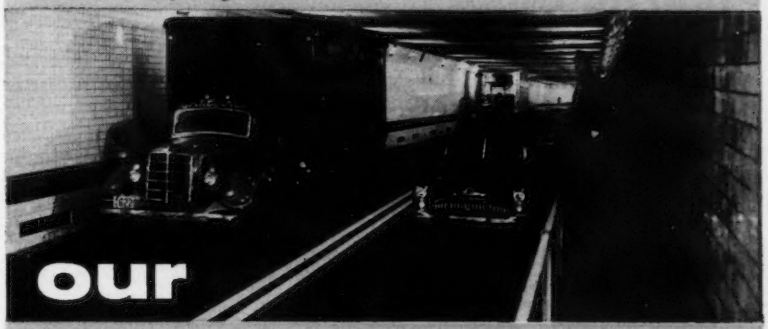
The first, by C. A. Rothrock and L. E. Keefer, gives the results of a special

(Continued on page 527)



"Our painted crosswalks lasted approximately 4 weeks. PERMA-LINE crosswalks were still readily discernible after 18 months. The long life qualities of PERMA-LINE have materially aided our painting program . . . released busy crews for operations in outlying areas . . . resulted in substantial monetary savings."

Lloyd M. Braff
General Manager
Department of Traffic
Los Angeles, Cal.



"Recently, we installed permanent double white PERMA-LINE centerline markers in the Holland Tunnel to eliminate the need for repainting on a monthly basis."

Charles H. Taylor
Director of
Tunnels & Bridges
The Port of N. Y. Authority

"We have found it less expensive to install and maintain PERMA-LINE than any type of paint marking we could use. In addition, we have the valuable advantage in the central business district of less frequent interruption of traffic due to maintenance operations."

Karl A. Bevins
Traffic Engineer
Atlanta, Georgia

SURE CURE FOR PAVEMENT MARKING HEADACHES

Modern Traffic Engineers the nation over count on guaranteed PERMA-LINE to expand their safety marking programs. PERMA-LINE meets today's demands for increased safety coverage, despite tight budgets and costly personnel.

REASON: PERMA-LINE outlasts old-fashioned marking methods 6 to 8 times, makes your present maintenance crews 6 to 8 times more effective.

PERMA-LINE ends installation traffic snarls because it is quickly and easily applied, sustains full traffic impact almost immediately, increases in brilliance with use, actually forms a bond with the pavement surface.

perma-line

VEON CHEMICAL CORPORATION • 22-09 BRIDGE PLAZA NORTH • LONG ISLAND CITY 1, N.Y.

For free illustrated brochure and the name of your nearest distributor fill in this coupon.

NAME _____ TITLE _____

ADDRESS _____

CITY _____ STATE _____

NEW! for greater SAFETY

SAF-T-GLO

*U.S. Pat. Number 2,719,505

FLUORESCENT COLOR

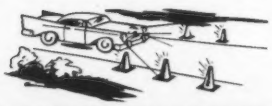
SAFE-T-CONE*

ALL-RUBBER

TRAFFIC GUIDES

Light up like flares in sunlight or headlights!

They just can't miss being seen. Brilliant fluorescent color flashes instant warning – day or night – for a new high in safety at danger points.



Tough, strong, built to last . . . yet light in weight, low in cost. SAFE-T-CONES are ideal for every traffic control need.

2182

Genuine SAFE-T-CONES made only by Radiator Specialty Co., Charlotte, N. C.

YEARBOOK CHANGES

BARTON, Eugene A. (Member)
Chief, Traffic & Parking, H. K. Ferguson Company, 1783 East 11th Street, Cleveland 14, Ohio.

BERRY, Donald S. (Member)
Professor of Civil Engineering, Civil Engineering Department, Northwestern University, Evanston, Illinois.

DEETZ, Russell S. (Member)
Deputy Executive Director, Ohio Turnpike Commission, 8620 Lindberg Boulevard, Berea, Ohio.

DIMITRI, Michael S. (Junior)
Traffic Engineer, Ramp Buildings Corporation, New York. SEND MAIL: 35-44 75th Street, Apt. 1-E, Jackson Heights 72, New York.

FOWLER, Paul H. (Associate)
Traffic Engineer, San Diego County Road Department, San Diego. SEND MAIL: 655 Wrelton Drive, La Jolla, California.

GREGORY, Randolph T. (Associate)
Director of Traffic & Planning, City Hall, Waco, Texas.

GRUNOW, Robert N. (Member)
Highway Engineer, Automotive Safety Foundation. SEND MAIL: 6101 16th Street, N. W., Apt. 412, Washington 11, D. C.

HENSLEY, Marble J. (Member)
Director, Traffic & Planning Department, 215 City Hall, Chatanooga, Tennessee.

HOUGHTAILING, George K. (Member)
Planning Consultant, R. M. Towill Corporation, Ltd., 233 Merchant Street, Honolulu, Hawaii.

HUBBARD, Robert A. (Junior)
Highway Engineer, Traffic & Planning Division, Virginia Department of Highways, 1221 East Broad Street, Richmond, Virginia.

HUNNICUTT, J. Madison, Jr. (Associate)
General Manager, Nashville Parking Board, 303 City Office Building, Nashville 10, Tennessee.

KOLTNOW, Peter G. (Junior)
Traffic Engineer, County of Fresno. SEND MAIL: 1239 West Normal Street, Fresno 5, California.

LARSON, Robert A. (Junior)
Assistant Planning Engineer, Wayne County Road Commission, 7th Floor, City-County Building, Detroit, Michigan.

LEONARD, H. Jack (Member)
Associate, Edwards, Kelcey & Beck, 3 William Street, Newark, New Jersey.

LOTSPEICH, M. W., Jr. (Junior)
Assistant Traffic Engineer, Idaho Department of Highways. SEND MAIL: 511 Village Lane, Boise, Idaho.

MILLER, C. Harold (Junior)
City Traffic Engineer, Room 411, City Hall, Tulsa, Oklahoma.

Institute Affairs

27th ANNUAL MEETING
Detroit, Michigan
September 23-26, 1957

(Preliminary)

Monday, September 23

MORNING
- Registration and Committee Meetings

NOON
- Opening Luncheon

AFTERNOON
- Past Presidents' Award Paper (digest)
- Matson Memorial Award Paper (digest)
- Technical Departments (concurrent sessions)

Tuesday, September 24

MORNING
- The Highway Safety Study—C. W. Prisk, U. S. Bureau of Public Roads
- Research as Applied to Traffic Engineering—Dr. Lawrence R. Hafstad, Vice Pres. for Research, General Motors Corp.
- Public Relations in Traffic Engineering—Mrs. Lee K. Jaffee, Director of Public Relations, Port of New York Authority

AFTERNOON
- Field Trip

Wednesday, September 25

MORNING
- Design Standards for Tomorrow—Charles M. Noble, Director of Highways, State of Ohio
- What Highway Users Expect from Traffic Engineering—Russell E. Singer, Executive Vice President, AAA
- Electronic Equipment in Traffic Engineering—J. Douglas Carroll, Chicago Metropolitan Area Traffic Study

AFTERNOON
- Field Trip

Thursday, September 26

MORNING
- Annual Business Meeting

AFTERNOON
- The Traffic Engineer in Over-All Planning—Henry Sullivan, President, American Society of Planning Officials
- What the Public Expects of the Traffic Engineer—Wm. S. Lampe, Editor, Pittsburgh *Sun Telegraph*
- Manpower, In-Service Training and Professional Education—Panel discussion

EVENING
- Annual Banquet

NEW PUBLICATIONS

(Continued from page 525)

study, financed by the Yale Bureau of Highway Traffic, in which careful and precise measurements were obtained during an 8-hour period of the progress of all vehicles in a lane of traffic through a test section subject to congestion.

The second paper, by W. J. Mortimer, describes a "Moving Vehicle Method of Estimating Traffic Volumes and Speeds," as used by Cook County, Illinois, in traffic studies.

"Speed and Travel Time Measurement in Urban Areas" is discussed in the third paper, which is a committee report comparing the merits of the several methods for determining travel time and/or speed on urban highway facilities.

Shopping District Parking Study

Department of Planning and Department of Traffic Engineering, City of Baltimore, Md., April 1957, 44 pp. (processed).

While this is a local study and the specific results will be of value only to Baltimore, the method and the general conclusions will be of wider interest.

Thirty-five shopping areas were examined, with a so-called *critical* parking demand calculated for each. Most of the areas were deficient in parking, with the greatest deficits occurring (as might be expected) in the older districts.

The major recommendation is for a concerted attack by all interested agencies following a definitive program.

Columbus Transit Present and Future

Simpson and Curtin, 1405 Locust St., Philadelphia, Penna., May 1957, 46 pp.

This report is a consultant's report, prepared for the transit operator in Columbus, Ohio.

Of principal interest to traffic engineers in general is a suggestion for the construction of four parking terminals on a proposed "inner belt" freeway, with shuttle bus service from these terminals to the downtown business area.

Suggested is use of the shuttle for packages too, with a two-way radio system so the shoppers car can be brought to the terminal gate point for easy package transfer from bus to car.

Section News

LOCAL SECTION OFFICERS

Canadian Section
President.....K. S. Vaughn-Birch
Vice President.....S. Cass
Sec'y-Treasurer.....Grant A. Bacchus
179 Tavistock Road, Downsview, Ontario

Indiana Section
President.....Wm. H. Bilby
Vice President.....James H. Cox
Secy'y-Treasurer.....Frank S. Vukovits
1830 Pershing Street, South Bend 28, Indiana

Michigan Section
President.....Allen T. Hayes
Vice President.....Wm. L. Marvin
Sec'y-Treasurer.....Russell E. Harrison
Wayne County Road Commission, 14380 Wyoming Avenue, Detroit 38, Michigan.

Mid-Atlantic Section
President.....Michael J. Gittens
Vice President.....Paul D. Muffley
Sec'y-Treasurer.....William S. Canning
Rose Valley Road, Wallingford, Pennsylvania

Midwest Section
President.....George F. Hagenauer
Vice President.....John W. Zimmerman
Sec'y-Treasurer.....A. L. Forde
709 City Hall, Chicago 27, Illinois

Missouri Valley Section
President.....Jack A. Hutter
Vice President.....A. J. Basile
Sec'y-Treasurer.....James E. Angell
7608 E. Morris Street, Wichita, Kansas

New England Section
President.....Roger Chandler
Vice President.....A. Wallace Gove
Sec'y-Treasurer.....Matthew J. Huber
Yale Bureau of Highway Traffic, 311 Strathcona Hall, New Haven 11, Conn.

N. Y. Metropolitan Section
President.....H. Jack Leonard
Vice President.....Arnold G. Fisch
Sec'y-Treasurer.....Gordon K. Gravelle
100 Gold Street, New York 38, New York

Ohio Section
President.....J. A. Carrothers
Vice President.....H. B. Woodling
Sec'y-Treasurer.....V. J. Musick
Central Police Station, Columbus, Ohio

Puerto Rico Section
Election results not reported as of July 9, 1957

Southern Section
President.....William H. Mann
Vice President.....Fenton F. Jordan
Sec'y-Treasurer.....John T. Hanna
3425 Cutshaw Avenue, Richmond, Va.

Texas Section
President.....J. S. Saylor
Vice President.....W. H. Carsten
Sec'y-Treasurer.....William C. Brandes
2701 No. Britain Street, Irving, Texas

Washington D. C. Section
President.....M. A. Butcher
Vice President.....Alan M. Voorhees
Sec'y-Treasurer.....James L. Foley
J. E. Greiner Company, 1106 N. Charles Street, Baltimore, Maryland

Western Section
President.....Ellis L. Mathes
Vice President.....Robert E. Dunn
Sec'y-Treasurer.....Charles E. Haley
112 So. 9th Street, Phoenix, Arizona

WESTERN SECTION

Los Angeles Area

A very successful meeting was held on March 28, 1957, at the Los Angeles Police Academy of the Los Angeles Area of the Western Section of the ITE. Our able Vice-President, *Joe Havenner,* has long championed a work shop section preceding the dinner and at this meeting the first session of our work shop was held. The work shop is under the able direction of *Lou Clearwater* and *Karl Jagenburg* of the Los Angeles Department of Traffic; *L. M. Frink,* Los Angeles County Road Department; and *Elmer J. Leland* of the Traffic Department of the City of Long Beach. The session lasted one hour and one and all benefited from the many problems and possible solutions to these problems that evolved from the discussion brought forth in this work shop. It is now tentatively planned that all of our local meetings will be preceded by this one hour work shop with different phases of traffic engineering presented at each get-together.

The meeting proved to be a tremendous success with 91 persons in attendance. After dinner the boys from the Los Angeles County Road Department headed by *Harry (What's My Line) Parker,* presented an extremely interesting and informative discussion on the subject, "Should Signals be Replaced by the Four-Way Stop Sign." In passing, it should be noted that we were unable to determine exactly what Mr. Parker's line was. After this able presentation, the group disbanded, thoroughly confused and definitely split into two groups, those for the stop sign and those for the traffic signal. Our roving ambassador of good will, *"Skinny" De Young,* was found standing in the fern dell surrounding the Police Academy muttering dire threats against the group promoting the extended usage of the stop sign.

It was a pleasure to see *Hank Evans* at

the meeting. Other members and visitors that came from outlying areas included Mr. *Benton James* from the City of Inglewood; *Dick Bateman* with Stone and Youngberg; *Jack Henberger* with AGA; *Red Matthews* from Econolite Corp.; *Al Pontius* and *Dean Irons* from Minnesota Mining; and, *Bill Flye,* Traffic Engineer of Riverside.

Phoenix Area

A 70 million dollar Bond Issue is to be proposed to Phoenix voters in May. Everyone feels that the Bond Issue will pass. Over 6 million dollars is designated for street and traffic improvements.

Phoenix now has a population of 172,000 with an area of 35 square miles, with approximately 350,000 people in the metropolitan area.

The Division of Traffic Engineering just lost a battle with the downtown merchants over the "Scramble System." Traffic Engineering was violently opposed to even a trial period. The City Council finally recommended at least a trial of the "Scramble System." The "Scramble System" is now being tried at three intersections in the downtown area.

Inter-Mountain Area

On March 1st, a meeting of the Inter-Mountain Area was held at the Memorial Building on the University of Colorado Campus in Boulder. Those in attendance were: *Al Pepper, Jack Bruce, Bob O'Connell, Ray Halverson* and the special guest, *Bob Conradt* from New Mexico. The Area Meeting was held in conjunction with the University of Colorado's 30th Annual Highway Conference.

In a panel discussion on Intersectional Design, Traffic Engineers outnumbered the rest of the panel 3 to 1—that just goes to show you.

After the meeting at Boulder, *Al Pepper, Jack Bruce, Don Warnberg,* from Al's office and *Ray Halverson* made a tour of the Denver Area and a good time was had by all.

Idaho Area

Pocatello has been selected by the National Committee on Urban Transportation as one of the cities in the nation for a pilot study. *Gene Burbidge,* Planning Survey, is basically engaged in making preparations for the field operations connected with this study.

A brochure entitled "Idaho Campgrounds" prepared by the Traffic Division is now under contract for printing. The publication includes the location of campgrounds and principal mountain passes and grades on the State Highway System. Traffic laws and fish and game information are also included. It is available for free distribution at the Port of Entry and other tourist sources.

A four lane divided railroad underpass has just been contracted in Idaho Falls. Illumination on the approaches will be mercury vapor while that in the vehicle underpasses will be fluorescent. The pedestrian walkways, separate from the vehicle underpasses, presents a lighting problem due to the vandalism history in the area. Therefore, it is planned to shield the flush-mounted incandescent fixtures with a steel plate to make them inaccessible from below.

San Diego Area

Jim Reading and *Marty Bouman* organized a comparison test between various types of reflecting guide signs on a portion of the new highway 94 freeway not yet open to traffic. Most of the area members attended the test and an informal supper preceding it. Guests from the State Division of Highways and the City of San Diego were present with ITEr's *Jack Henberger, Don Robbins, Lucky Luckenbach, Hal Durham, Steve George,* and *Keith Gilbert.* Several nighttime test runs were made by the sign location using high and low headlight beams. The lights of opposing traffic were simulated by using other vehicles.

This new freeway, State sign route 94, is now being opened to traffic and will provide over eight miles of high-standard highway from San Diego to La Mesa, California.

Jim Reading's city traffic staff and *Ed Hall*'s transportation study group are cooperating again in data gathering operations. A north-south screen line count has just been completed and a travel time study is underway on city major streets. The County of San Diego and the Division of Highways are also participating in the study.

Northwest Area

April 11th and 12th were red letter days for the ITE members and other interested personnel from the Northwest because of the 10th Annual Northwest Traffic Engineering Conference held at the University of Washington under the chairmanship of Professor *Roy Sawhill.*

Dean Harold E. Wessman gave the welcoming address for the University of Washington, followed by William A. Bugge, Director of the Washington State Highway Department and President of the American Association of State Highway Officials. Mr. Bugge gave a very interesting and informative talk on the Federal Aid Highway Act of 1956 and how it will affect traffic engineering. Mr. Bugge was followed by *H. C. Higgins,* District Director of ITE, and *Bruce Crandall* of the Oregon State Highway Department. These men made the opening session, with *Rex G. Still,* Traffic Engineer for the Washington State Highway Department, presiding, one which resulted in favorable comments from all who were in attendance.

The other three sessions—"What's New in the Northwest", "Traffic Operations and Design" and "Traffic Planning and Research"—were handled by *Bruce Culver, Bob Dunn* and *Jim Gallagher,* respectively.

There were quite a number of Western ITE members participating in the program. From Seattle—*Bruce Culver, E. E. Lewarch, Myron Mitchell, Gerald Cysewski,* from Olympia—*Bob Dunn, Bob Hansen, Gene Ireland, John Mladinov, Rex Still;* from Tacoma—*Yosh Kosai;* others—*Lawrence George* and *J. Al Head,* both from the State of Oregon, *Norm Kennedy,* ITTE, *Marv Lotspeich* from the City of Spokane, Washington, and *Maurice RiChey* from the State of Montana. Other panel members who are not WesternIte members were Irving Rodley, City Engineer, City of Bellevue, Washington, and John Spaeth, Director of Planning, City of Seattle.

One of the highlights of the conference was the State of California's movie "Freeway Traffic Flow." It was scheduled for the conference only; however, it was shown three other times to interested personnel, and the program committee wish to extend their personal thanks to *George Webb* for making it available for the conference.

Other News: *Jim Gallagher* is no longer District Traffic Engineer in Vancouver, Washington, but is now Assistant District Location Engineer. *Bill Kingman,* when he returned from Yale, will take Jim's place, and *Bruce Davidson* is continuing on in Wenatchee where he has been capably handling the duties while Bill has been at Yale.

Complete kit ONLY $69.50

Here's everything you need to give hazards nighttime visibility so they can be seen. "Codit" Reflective Liquid sprays on, brushes on. Gives you safety for just 17¢ per square foot. Buy several kits from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minn.

Kit contains 6 oz. spray cans, 4 lb. cans, brushes, stencils, plans, instructions.

PRODUCT OF 3M RESEARCH

Positions Available

AUTOMOBILE CLUB OF SOUTHERN CALIFORNIA

Position: Traffic Engineer.

Duties: Provide traffic engineering advisory service to cities and other agencies. Promote the profession of Traffice Engineering.

Requirements: Engineering degree. Graduate training in traffic engineering or equivalent experience. Under 35.

Salary: Open. Subject qualifications.

Apply: John W. McDonald, Highway Engineer, Automobile Club of Southern California, P. O. Box 2890, Terminal Annex, Los Angeles 54, California.

CINCINNATI, OHIO

Position: Utilities Electrical Engineer III.

Requirements: Engineering degree, electrical preferred. Two years experience in engineering associated with traffic control, street lighting, underground electrical service, municipal utilities or applied electronics.

Salary: $135-$150, weekly. Benefits include Hospitalization, Retirement, Sick Leave and Vacation.

Apply: Department of Public Utilities, 417 Lincoln Park Drive, Cincinnati 3, Ohio.

SACRAMENTO, CALIFORNIA

Position: Assistant engineer—traffic.

Requirements: B.S. in civil engineering from accredited college. Two years traffic engineering desirable but applicant with less experience will be considered.

Salary: $525 to $650 per month ($550 after six months).

Apply: Personnel Department, Room 303, City Hall, Sacramento, California.

HAMILTON, ONTARIO

Position: Traffic Engineer.

Requirements: Graduate engineer from a recognized university, with a thorough knowledge of traffic engineering practices and a minimum of 2 to 5 years of practical experience. Should be a member of the Association of Professional Engineers of Ontario and preferably a member of the Institute of Traffic Engineers.

Salary: Starting salary commensurate with previous experience. Position offers continuity of employment, excellent fringe benefits, and opportunity for advancement in rapidly expanding community.

Apply: Send all particulars, including educational qualifications, experience and salary required, to J. R. Jones, Secretary, Board of Control, City Hall, Hamilton, Ontario.

MUNICIPAL BUS SYSTEM

Position: Chief, Traffic Department.

Requirements: Four years of college with demonstrated responsibile experience in traffic engineering, including its application to the operations of a large local bus system. Responsibilities of Department include community relations, route planning and development, traffic checking, and scheduling. This is a new department in the organization.

Salary: Open.

Apply: Box 78, c/o ITE Headquarters.

WICHITA, KANSAS

Position: Traffic Engineer, to direct activities of TE Division under the Director of Service.

Requirements: Engineering degree and basic knowledge of traffic engineering.

Salary: $565-$690 per month, with fringe benefits.

Apply: George J. Fisher, Director of Service, 205 City Building, Wichita, Kansas.

THE TRAFICOUNTER, JR.

is a simple, sturdy, time-tested device for traffic counting. It is pneumatically actuated by means of the road tube attachment.

Traffic volume is easily read on direct reading counter. Can be rapidly installed anywhere. Rugged construction; will last for years.

Write for illustrated Bulletin.

TORONTO, ONTARIO E. A. HORTON SALES CO., 3071 BLOOR ST. WEST

THE STANDARD OF ACCURACY SINCE 1888

STREETER-AMET COMPANY

GRAYSLAKE • ILLINOIS

Branches in Detroit, Pittsburgh, Allentown, Birmingham and Los Angeles

Reference Notes

School Crossing Protection

A report of Technical Committee 3-B of the Institute of Traffic Engineers, approved as an Interim Report by the Technical Council and the Board of Direction and authorized for publication.

In the past, numerous fine articles and reports have been written on school crossing protection by authorities from engineering, enforcement, schools, automobile clubs and other organizations. After carefully reviewing these articles and reports, we of the committee come to the following conclusions:

1. There is evidence that traffic authorities, school authorities and others, are in general agreement on certain important phases of the school crossing problem such as policies, warrants and the method of determining the need for protection at school crossings. It is now appropriate to consolidate this thinking into concise statements.

2. Considerable work remains before uniform standards on school crossing protection can be obtained that will be agreeable to most traffic authorities. Uniformity can probably best be acquired when sponsored at the state highway department level and with due consideration to the needs and viewpoints of state, county and municipal traffic authorities.

This report reviews policies, warrants, and methods used by various traffic authorities throughout this country. The aim is for one common school crossing protection program that will be agreeable to all concerned.

POLICIES

Coordination of School Crossing Program

An official coordinating committee, composed of representatives from engineering, enforcement and the schools, should be formed. Its duty should be that of cooperating in all activities concerning a school crossing protection program. Official representatives of the parent-teacher association, safety council, etc. should be invited to participate.

School Route Plan

A school route plan should be developed for each elementary and kindergarten school area for the purpose of providing maximum protection at a minimum of cost. This plan would consist of selected routes designed to minimize the potential risks for children when going to and from school.

Children should be routed to take advantage of existing sidewalks, adequate shoulders, and traffic controls.

At the beginning of each school year members of the coordinating committee should initiate programs to instruct children carefully in the use of school routes, inform parents of the routes, and persuade parents to cooperate fully in getting children to use them.

Crossing Studies

A study should be made of each major crossing to determine if adequate gaps in vehicular movement are available for pedestrians or if unusual physical conditions create a hazard. An adequate gap is one of sufficient duration to permit a pedestrian to cross the roadway safely.

Traffic authorities should take steps to correct a situation where natural gaps in traffic are too small or too infrequent or unusual physical conditions cause a hazard to children crossing the roadway.

Priorities should be given to locations involving greatest potential conflict between crossing children and passing vehicular traffic.

Children should be routed to utilize crossings where adequate gaps in traffic are available for pedestrians, or where traffic controls exist. Crossings should be consolidated so that there are a minimum on any major artery.

School authorities should plan their districts to avoid hazardous crossings, particularly where only a few children are involved.

Child Education

Instruction of children in safe walking and bicycle riding practices and the use of the school route plan should be a school responsibility.

The school training and supervision program should develop in all children at the earliest possible age the ability to take care of themselves and to assume responsibility for their own safety at school or all street crossings.

Traffic authorities should advise the schools of any unusual factors related to specific crossings which require special emphasis in the child education program.

WARRANTS

Crossing Guards

Authority to stop traffic for pedestrians to cross should be limited to enforcement officers or duly appointed, uniformed adult crossing guards individually trained by the enforcement agency. Other adult guards should only aid in the selection of adequate gaps for pedestrians in addition to controlling the children, and should be used only where school safety patrols are not applicable.

Instruction, assignment, and supervision of crossing guards should be an enforcement agency responsibility.

Crossing guards should aid in the development of the children's ability to take care of themselves at all crossings, and should not relieve children of all responsibility at school crossings.

School Safety Patrols

The school safety patrol should be assigned to crossings adjacent to school grounds where gaps in traffic are adequate and frequent but additional supervision of children is desired.

School safety patrols should not be permitted to direct vehicular traffic for the purpose of creating gaps for pedestrians.

School authorities should have the responsibility of organizing, training, and supervising the school safety patrol. They may seek the cooperation of enforcement agencies in this work.

Signals

School traffic signals, when installed to create adequate gaps in traffic for pedestrians, should be designed and operated in a manner that will create a minimum of delay and hazard to vehicular traffic.

School traffic signals should be installed where crossing guards, police officers, underpasses, or overpasses are not economically feasible, and where unusual physical conditions may warrant such an installation.

Stop Signs

If usual warrants are not met, stop signs should not be used for the sole purpose of creating gaps in traffic.

Underpasses or Overpasses

A pedestrian underpass or overpass for a school crossing should be constructed where adequate gaps for pedestrians in traffic are not available, and economics and location make such an installation feasible.

Appropriate measures should be taken by school traffic authorities to assure the proper use of underpasses or overpasses by children and other pedestrians.

Traffic Signs and Pavement Markings

Traffic signs and pavement markings should conform to state highway standards.

Wherever possible, school crosswalk signs and special pavement markings should be limited to locations adjacent to the school grounds or to the block in which the school is located.

Speed Zoning Adjacent to Schools

A speed zone survey should be made by traffic authorities in accordance with uniform engineering practices to determine the minimum realistic and enforceable speed limit to be used adjacent to schools.

Parking

Parking should be prohibited at the curb adjacent to school grounds, at least along unfenced areas, during the hours of use authorized by the school.

Period of Operation

School crossing signs and signals should be covered or removed during periods when not applicable.

Sidewalks

Sidewalks should be constructed in urban areas along school routes where they are lacking.

METHODS OF ANALYZING SCHOOL CROSSINGS FOR TRAFFIC CONTROLS

Traffic authorities have used the following four methods of analyzing school crossings for traffic controls. These methods base the need for controls on the availability of frequent and adequate gaps in traffic for use by groups of pedestrians when crossing at a school crosswalk.

Method No. 1

The International Chiefs of Police and the Institute of Traffic Engineers jointly proposed a theoretical method of analysis based on the use of Poisson's exponential series as related to random traffic flow across an uncontrolled school crossing.

Procedure: Hourly traffic counts and the maximum number of children per group are determined at the school crossing during the period children are going to and from school. The curb to curb pavement width or length of school crossing is obtained. This information is applied to the graph entitled "Method No. 1" to determine the need for traffic control. (See Bibliography Item No. 2 for further information on this method.)

Method No. 2

The School Crossing Protection Committee report to the ITE Technical Council dated October 1, 1953, recommended another method of analysis, also based on Poisson's experimental series but with some variation from Method No. 1.

Procedure: Same as Method No. 1 except that this information is applied to a graph entitled "Method No. 2" to determine the need for traffic control. (See Bibliography Item No. 4 for further information on this method.)

Method No. 3

Robert D. Dier proposed a method of analysis based on the use of actual field surveys to determine the frequency of traffic gaps at school crossings.

Procedure: The survey is conducted during the periods children are going to and from school. The field survey obtains the following: 1) the width of roadway; 2) the largest number of children crossing per group; 3) the total time of all adequate gap time intervals in traffic for pedestrians during the survey period. The adequate gap in the traffic for pedestrians in seconds

$$= \frac{W}{3.5} + 3 + \left(\frac{N}{5} - 1\right) 2$$

(See explanation of constants and variables on graph entitled "Method No. 3"). The total pedestrian delay time is calculated in per cent by subtracting the total adequate gap time from the total survey time and dividing the resulty by the total survey time. The above data is applied to graph ("Method No. 3") to determine the need for traffic control (See Bibliography Item No. 7 for further information on this method).

Method No. 4

This method is proposed as a modification of Method No. 3 for use at school crossings at signalized intersections.

Procedure: The survey is conducted during the periods children are going to and from school. The field survey measures the adequate gaps in the traffic making turning movements across the one-half unprotected portion of the intersection school crosswalks. (See assumptions on graph entitled "Method No. 4".) The survey also obtains: 1) the width of roadway; 2) the largest number of children crossing per group; 3) the total time of all adequate gap time intervals during the survey period. Adequate gap in seconds

$$= \frac{W}{(3.5)\ (2)} + 3 + \left(\frac{N}{5} - 1\right) 2$$

(See explanation of constants and variables on graph Method No. 4). The total pedestrian delay time is calculated the same as for Method No. 3. The above data is applied to graph entitled "Method No. 4" to determine the need for traffic control.

BIBLIOGRAPHY

1. "Traffic Engineering Handbook" (2nd Edition) pp. 109-111, 251, 411
   Institute of Traffic Engineers, Washington, D. C.
2. "Report on Warrants for Traffic Officers at School Intersections"
   by the Joint Committee of the International Association of Chiefs of Police and the Institute of Traffic Engineers
   1947 Proceedings
   Institute of Traffic Engineers
3. "Protection at School Crossings"
   by Joseph E. Havenner
   Paper presented before the Sixth Annual Street and Highway Conference at Los Angeles, February 3, 1954
4. "Traffic Controls in the Vicinity of School Zones"
   by Lawrence Lawton, Chairman, ITE School Crossing Protection Committee
   "Traffic Engineering" March and April, 1954
5. "How Train the Child Pedestrian"
   by J. Stannard Baker
6. "School Crossing Protection"
   by Matthew C. Sielski
   Traffic Engineering, September, 1955
7. "Determining the Degree of Hazard at School Crossings"
   by Robert D. Dier
   "Traffic Engineering", January, 1955

METHOD NO. 1

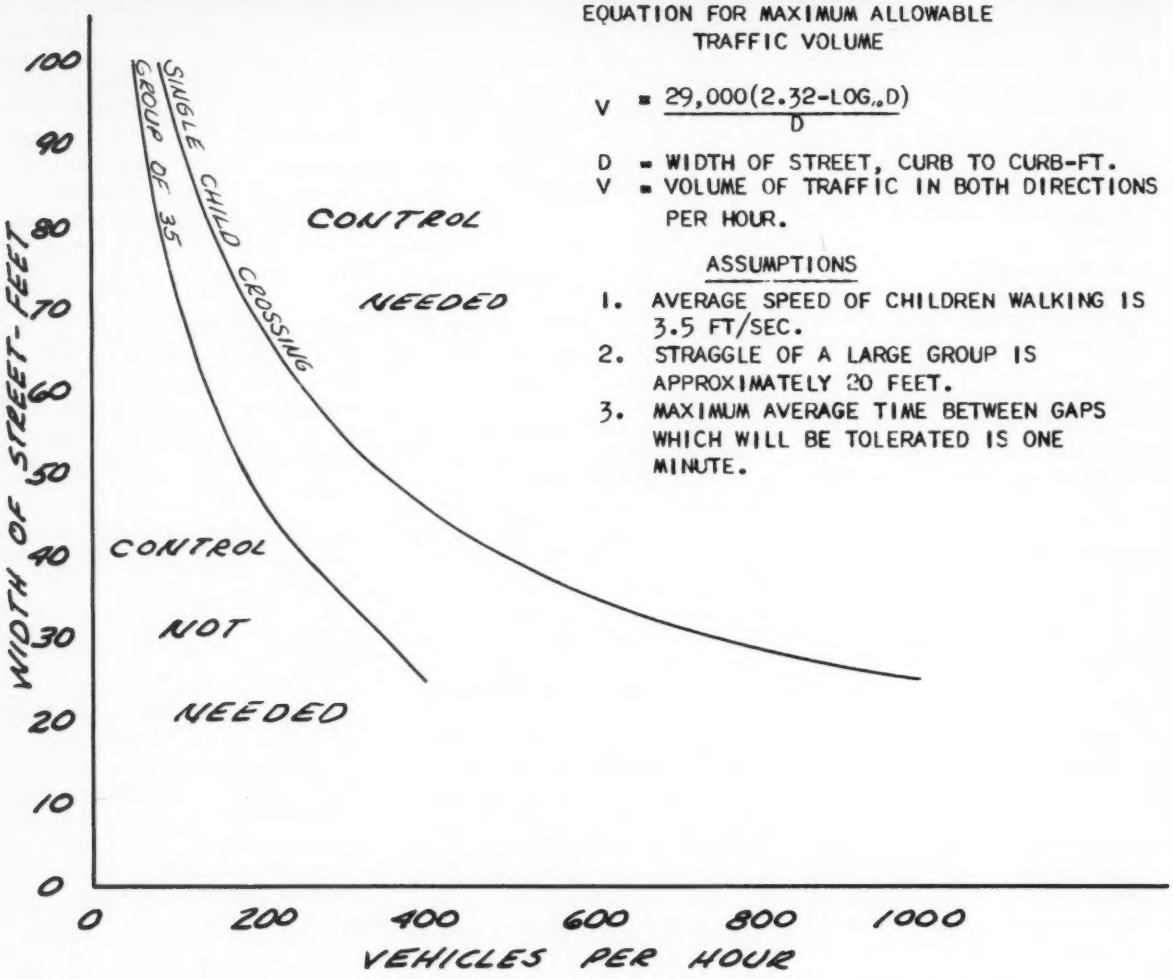
DERIVATION OF CURVES:
EQUATION FOR MAXIMUM ALLOWABLE TRAFFIC VOLUME

$$V = \frac{29{,}000(2.32 - \log_e D)}{D}$$

D = WIDTH OF STREET, CURB TO CURB-FT.
V = VOLUME OF TRAFFIC IN BOTH DIRECTIONS PER HOUR.

ASSUMPTIONS

1. AVERAGE SPEED OF CHILDREN WALKING IS 3.5 FT/SEC.
2. STRAGGLE OF A LARGE GROUP IS APPROXIMATELY 20 FEET.
3. MAXIMUM AVERAGE TIME BETWEEN GAPS WHICH WILL BE TOLERATED IS ONE MINUTE.



ITE AND IACP REQUIREMENTS

An officer is usually warranted at a school crossing when four conditions are fulfilled:

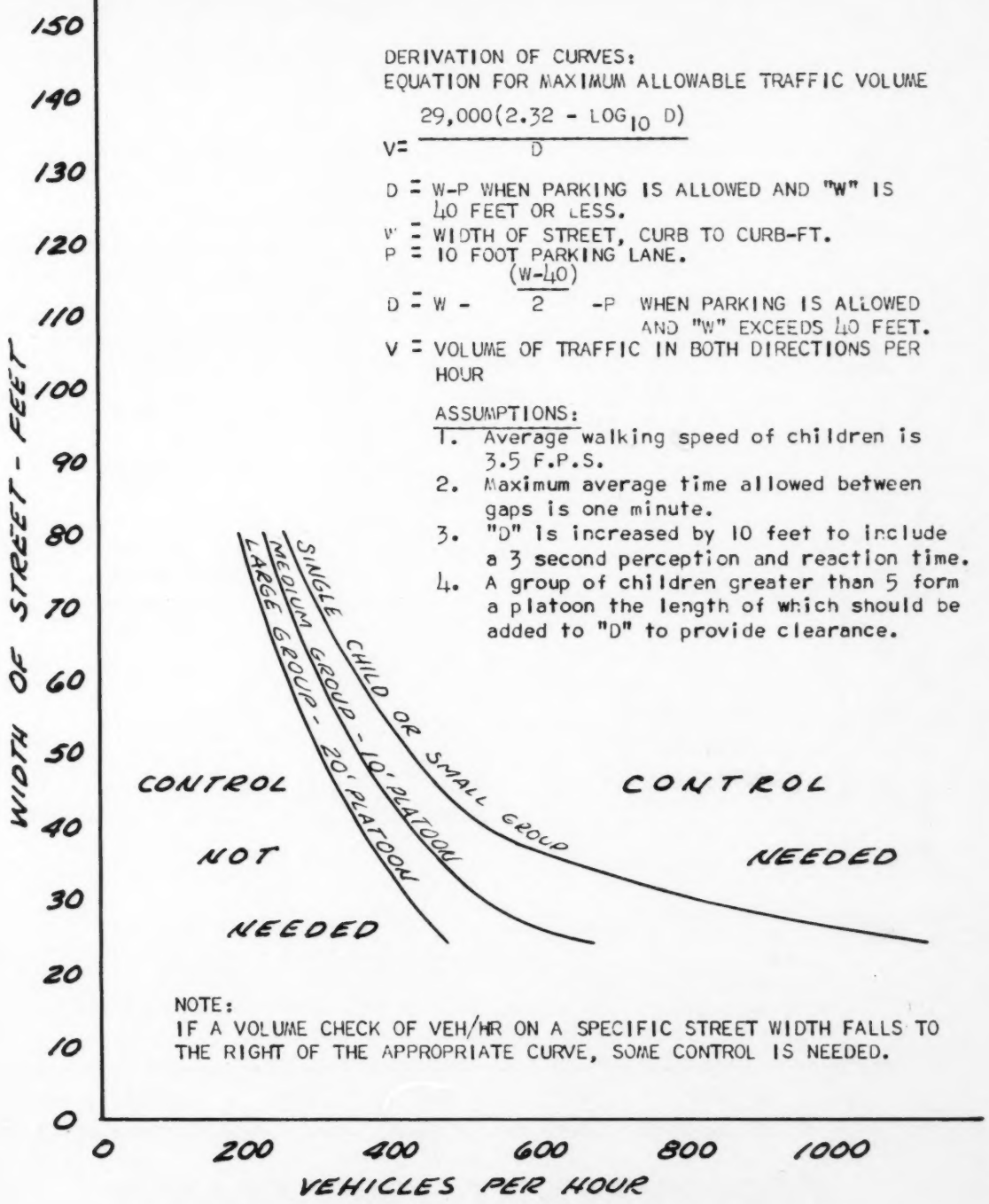
1. When adequate natural gaps in traffic for crossing on foot are not sufficiently frequent for safety as determined by the above chart.
2. Where the total cost of creating adequate gaps in traffic cannot be done more economically by properly designed traffic signals, by school employees, or others especially deputized for this purpose.
3. Where no other intersection in the community is known where police control of traffic would protect children at a lower cost per child.
4. Where the product of the traffic volume in thousands of vehicles per hour on the street while it is being crossed multiplied by the number of children crossing on their way to or from school exceeds 30.

REQUIREMENTS FOR TRAFFIC CONTROL AT SCHOOL CROSSINGS

I.A.C.P. & I.T.E.

Ref. "Report on Warrants for Traffic Officers at School Intersections" by the Joint Committee of the International Association of Chiefs of Police and the Institute of Traffic Engineers. 1947 Proceedings, Institute of Traffic Engineers.

METHOD NO. 2



DERIVATION OF CURVES:
EQUATION FOR MAXIMUM ALLOWABLE TRAFFIC VOLUME

$$V = \frac{29{,}000(2.32 - \log_{10} D)}{D}$$

D = W-P WHEN PARKING IS ALLOWED AND "W" IS 40 FEET OR LESS.
W = WIDTH OF STREET, CURB TO CURB-FT.
P = 10 FOOT PARKING LANE.

$$D = W - \frac{(W-40)}{2} - P$$ WHEN PARKING IS ALLOWED AND "W" EXCEEDS 40 FEET.

V = VOLUME OF TRAFFIC IN BOTH DIRECTIONS PER HOUR

ASSUMPTIONS:

1. Average walking speed of children is 3.5 F.P.S.
2. Maximum average time allowed between gaps is one minute.
3. "D" is increased by 10 feet to include a 3 second perception and reaction time.
4. A group of children greater than 5 form a platoon the length of which should be added to "D" to provide clearance.

NOTE:
IF A VOLUME CHECK OF VEH/HR ON A SPECIFIC STREET WIDTH FALLS TO THE RIGHT OF THE APPROPRIATE CURVE, SOME CONTROL IS NEEDED.

REQUIREMENTS FOR TRAFFIC CONTROL AT SCHOOL CROSSINGS

ITE SCHOOL CROSSING PROTECTION COMMITTEE - 1953

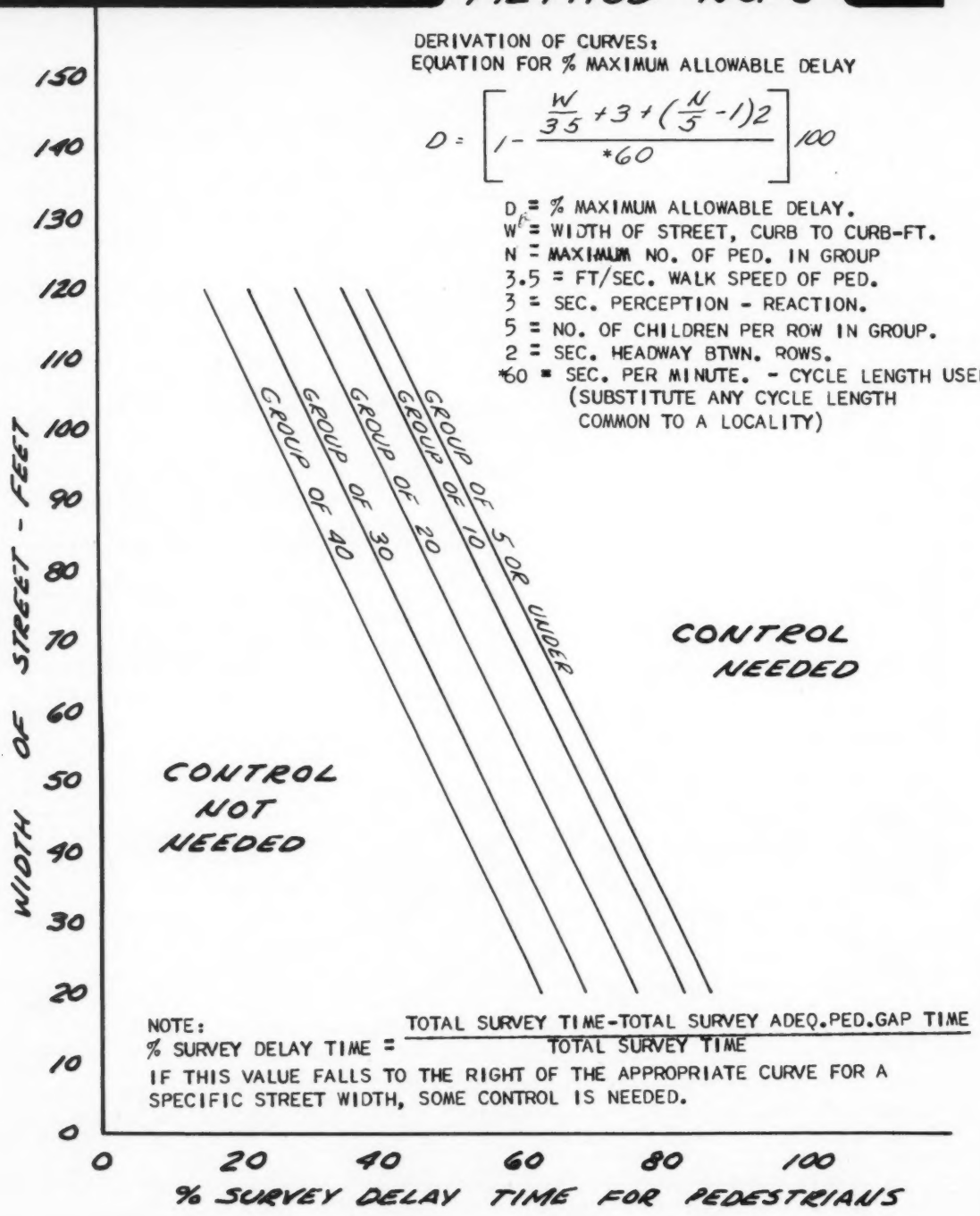
Ref. "Traffic Controls in the Vicinity of School Zones" by Lawrence Lawton, Chairman, ITE School Crossing Protection Committee, TRAFFIC ENGINEERING, March and April, 1954.

METHOD NO. 3

DERIVATION OF CURVES:
EQUATION FOR % MAXIMUM ALLOWABLE DELAY

$$D = \left[1 - \frac{\frac{W}{35} + 3 + \left(\frac{N}{5} - 1\right)2}{*60}\right] 100$$

D = % MAXIMUM ALLOWABLE DELAY.
W = WIDTH OF STREET, CURB TO CURB-FT.
N = MAXIMUM NO. OF PED. IN GROUP
3.5 = FT/SEC. WALK SPEED OF PED.
3 = SEC. PERCEPTION - REACTION.
5 = NO. OF CHILDREN PER ROW IN GROUP.
2 = SEC. HEADWAY BTWN. ROWS.
*60 = SEC. PER MINUTE. - CYCLE LENGTH USED. (SUBSTITUTE ANY CYCLE LENGTH COMMON TO A LOCALITY)

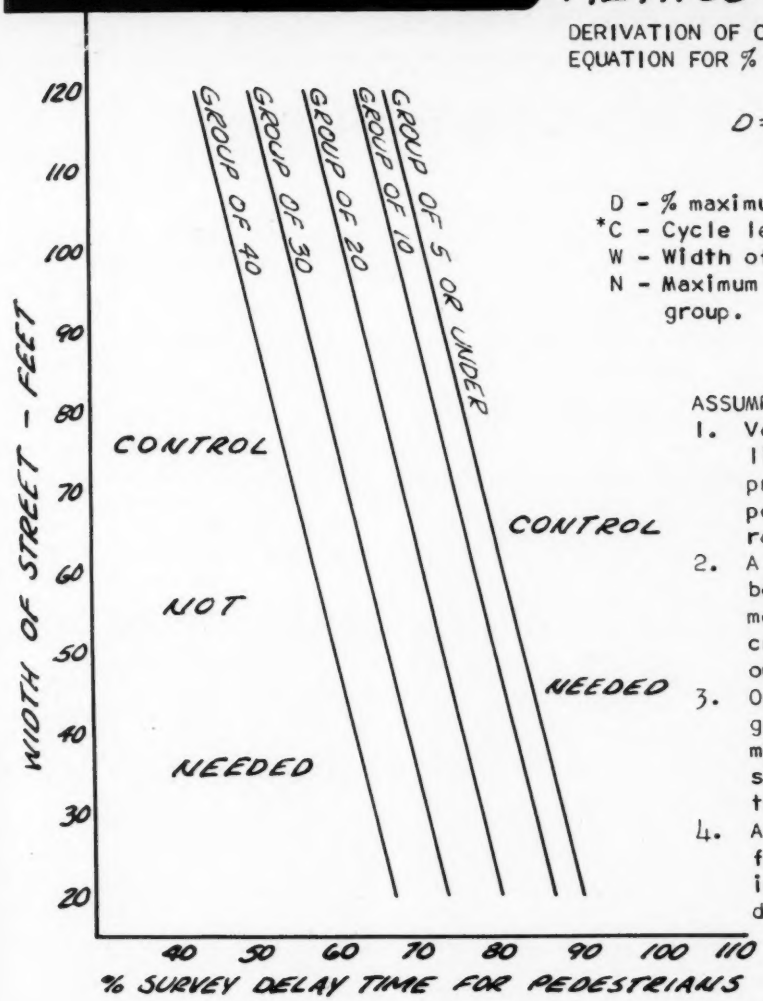


NOTE:
$$\%\ \text{SURVEY DELAY TIME} = \frac{\text{TOTAL SURVEY TIME} - \text{TOTAL SURVEY ADEQ.PED.GAP TIME}}{\text{TOTAL SURVEY TIME}}$$
IF THIS VALUE FALLS TO THE RIGHT OF THE APPROPRIATE CURVE FOR A SPECIFIC STREET WIDTH, SOME CONTROL IS NEEDED.

REQUIREMENTS FOR TRAFFIC CONTROL AT NON-SIGNALIZED SCHOOL CROSSINGS

Ref. "Determining the Degree of Hazard at School Crossings" by Robert D. Dier, TRAFFIC ENGINEERING, January, 1955.

METHOD NO. 4



DERIVATION OF CURVES:
EQUATION FOR % OF MAXIMUM ALLOWABLE DELAY

$$D = \left[1 - \frac{\frac{W}{(3.5)(2)} + 3 + \left(\frac{N}{3} - 1\right)2}{*C}\right] 100$$

D - % maximum allowable delay per cycle.
*C - Cycle length. (See note below.)
W - Width of street, curb to curb - ft.
N - Maximum number of pedestrians in group.

ASSUMPTIONS:

1. Vehicles waiting for a red light at crosswalk form a protective barrier for pedestrians for one-half of a roadway crossing.
2. A gap and delay survey should be taken of all turning movements over the portion of the crosswalk in the unprotected one-half of the roadway.
3. Only those adequate pedestrian gaps occurring between turning movements during the green signal period for the pedestrian crossing are considered.
4. All of the red signal period for this pedestrian crossing is considered as pedestrian delay time, whether moving vehicles are offering opposition to the pedestrian or not.

Note:

$$\% \text{ SURVEY DELAY TIME} = \frac{\text{TOTAL SURVEY TIME} - \text{TOTAL SURVEY ADEQ. PED. GAP TIME}}{\text{TOTAL SURVEY TIME}}$$

IF THIS VALUE FALLS TO THE RIGHT OF THE APPROPRIATE CURVE FOR A SPECIFIC STREET WIDTH, SOME CONTROL IS NEEDED.

*NOTE: FOR THE PURPOSE OF THIS CHART, 60 SECONDS WAS USED FOR THE CYCLE LENGTH. FOR ANY OTHER CYCLE LENGTH, A SIMILAR CHART CAN BE CONSTRUCTED BY USING THE ABOVE EQUATION.

REQUIREMENTS FOR ADDITIONAL CONTROL AT SIGNALIZED SCHOOL CROSSINGS

Reference Notes

Parking Meters

This is a report of Technical Committee 4C of the Institute, approved as an Information Report by the Technical Council and the Board of Direction and authorized for publication.

Description and Purposes of The Parking Meter

1. A parking meter is a coin-actuated mechanical time-measuring device placed so as to control curb or off-street parking spaces. The parking meter indicates the remaining portion, or the expiration of the time period for which it has been actuated.
2. Parking meters are classified as:
   Automatic if operation of the timing mechanism requires only the insertion of a coin.
   Manual if operation of the timing mechanism requires the turning of a lever or a similar action in addition to the insertion of a coin.
3. The purpose of the parking meter is to improve utilization of public parking space by increasing turnover, and to facilitate enforcement of parking time limits.

Warrant

Curb parking meters are warranted as an aid in the control of parking in a given block side if all of the following conditions exist:

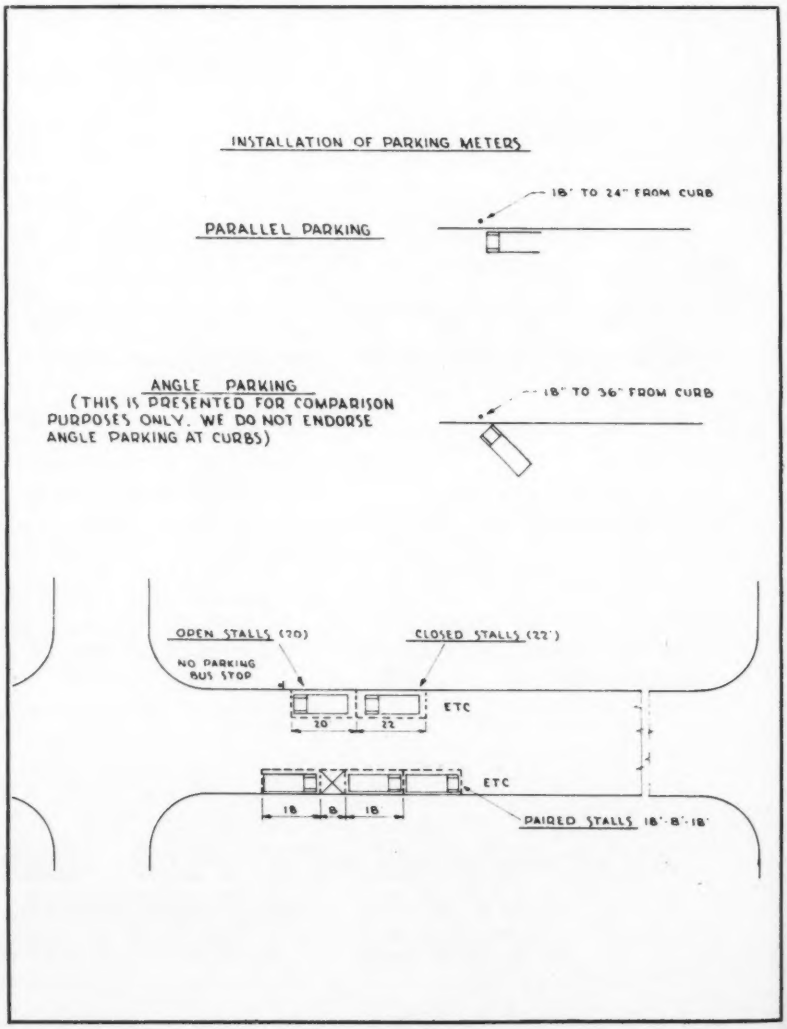
a. Parking time limits exist and are enforced.
b. High demand is indicated by usage of at least 70% of the available space hours during the time of limited parking.
c. The block side is within walking distance of generators of high short-time parking demands, such as stores and office buildings.
d. Observation shows need for greater turnover, indicated, for example, by:
   1. High average parking duration.
   2. High level of enforcement required to prevent parking violations.
   3. Cruising by drivers desiring parking space.

Installation

a. The meter should be installed as follows:

	Parallel Parking	Angle* Parking
Distance from curb	18″-24″	18″-36″
Distance from front end of stall		
Single stall meter	12″-36″	24″-72″
Two-stall meter	On separation line	On separation line
Height of coin slot above sidewalk	48″-54″	48″-54″

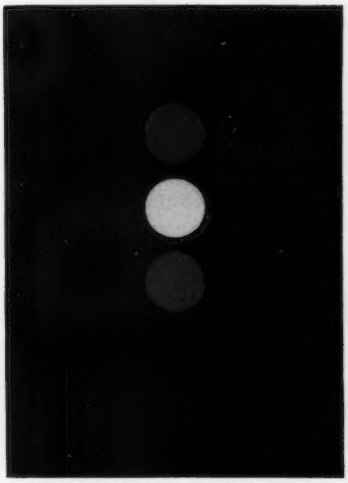
b. Parking stalls shall have the following minimum lengths:
   Open stalls: 20′
   Closed stalls: 22′
   Paired stalls: 18′-8′-18′
   'Open' stalls are those bordering on one or both ends on no-parking zones. 'Closed' stalls are those bordering on both ends on other parking stalls. 'Paired' stalls, each two cars park bumper to bumper with spaces allowed for maneuvering.
c. All parking stalls equipped with meters shall have pavement markings.
*This column is included for reference only and is not an endorsement of angle parking at curbs.



What has color got to do with improved signing safety?

A traffic signal, by itself, can control heavy volume traffic loads 24 hours every day. Why? Because it carries the authority of a visual command. This command is given by *color* alone. Today, through the day and night performance of "Scotchlite" Reflective Sheeting, your traffic signs can speak with the same authority.

Traffic signs actually represent your voice, communicating a specific warning to the motorist. "Scotchlite" Sheeting makes sure your voice is heard by commanding attention at any hour, in any weather, with the dynamic, compelling force of vivid color.



Red, yellow and green traffic signal colors have conditioned motorists to the command of color. Traffic signs now can work in exactly the same way.

What does color do?

Reflective color makes your signs stand out from any background. Color emphasizes and strengthens the other sign elements of shape and legend because of its sharp contrast and high visibility. Color enables a motorist, (remember, he is color-conditioned because of traffic signals), to identify the purpose of each sign as quickly by night as by day.

For example, a motorist knows that the yellow sign ahead is a warning sign long before he can read the message. The distinctive diamond shape and vivid yellow color of the reflectorized sign told him so. The same idea holds true for each sign series.

This ability of color to command attention is particularly useful in this day of higher speeds and growing traffic volume. Today, the sign must get the drivers' attention through its own power. The compelling force of reflective color in "Scotchlite" Sheeting gets that attention fast. It warns the driver in time to act safely.

Where do sign colors come from?

They come, as we already have suggested, from the basic traffic spectrum. They are known colors familiar to the driver.

What better color, for instance, than red for a stop sign? Red in traffic signals has always meant STOP in no uncertain terms. The yellow color of the warning series is associated with CAUTION. Following this logical system, the green color, from the GO signal is becoming widely used in distance and direction signs. The white sign is the standard for the regulatory series—which, incidentally, is becoming more distinctive in its own right because of the growing shift to green for directional signs.

So you see, these colors are not new to traffic control. The long association of these colors to specific commands lets a motorist pick out one series from another with ease and at long range. Simply because color has alerted his attention and *pre-told* him what kind of condition to look for, the driver is mentally ready to react to your message.

Other values of color

The reflective color of "Scotchlite" Sheeting, according to some leading authorities, also is a valuable tool to help relieve the monotony of long-distance nighttime driving. Its stimulating effect combats fatigue . . . fights velocitization and hypnagogic conditions. It refreshes the mental outlook of the driver . . . improves his depth perception, helps him judge distances better. It alerts his mind . . . and an alert driver is a safer driver.

The vivid reflective color of "Scotchlite" Sheeting emphasizes sign shape and legend both night and day. It gives dramatic full-time effectiveness to *all three* sign elements.

* * *

Signs of "Scotchlite" Reflective Sheeting speak for you in all these ways. They speak in a voice that calls for attention day and night, in any weather, and from any approaching viewing angle. Get more information, including more data on color, from your 3M Representative soon. Or write for more details to: 3M Company, Dept. GS-47, St. Paul 6, Minn.

REG. U. S. PAT. OFF.

SCOTCHLITE

BRAND

REFLECTIVE SHEETING

PRODUCT OF 3M RESEARCH

The terms "Scotchlite" and "3M" are registered trademarks of Minnesota Mining & Mfg. Co., St. Paul 6, Minn. Gen. Export: 99 Park Ave., New York 16, N.Y. In Canada: P.O. Box 757, London, Ont.

Design and Marking

a. Parking meters shall include:
   1) A red 'violation' or 'time expiration' flag which should be easily visible to an enforcing officer checking the meters by vehicle.
   2) A time scale with a needle or other indicator showing unexpired time.
   3) A plate or sign attached to the meter, stating the hours of meter operation, the meter period and the parking fee. If there is a limitation on the coins which the meter will accept, this should be clearly indicated on the sign, such as 'nickels only'.

b. Standard parking control signs shall be used. In addition, parking meter posts may be painted distinctive colors to indicate the meter period or special restrictions.
   The type and hours of parking prohibitions may also be emphasized by repeating prohibition message on the meter or meter post.

c. No advertising, other than the manufacturer's name plate, shall be placed on the meter or the post.

Operation

a. The maximum permitted parking time indicated by the curb meter and its effective hours and days of operation shall be identical with those posted on the standard parking control signs.

b. The maximum permitted parking time in a metered area shall be determined by the same considerations as in any unmetered area of restricted parking.

Comments on Control, Enforcement, and Revenue Use

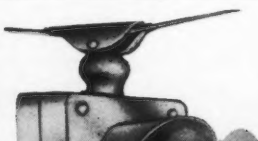
1. *Control* by traffic engineering personel should include:
   a. "Before and after" study at time of first installation.
   b. Periodic rechecks to ascertain effect of meters on turnover and effectiveness of enforcement.
   c. Maximum utilization of meter revenue records for parking study information.
2. *Enforcement* is outside the traffic engineer's duties, but within his field of interest. To serve the traffic engineer and the purpose of the parking meter best, enforcement shall be vigorous, consistent, and continuous. It should include:
   a. Checking meter flags during *all* hours of meter use.
   b. Spot checks of vehicles by tire mark or license plate to discourage paid for but illegal long-time parking.
   c. Vigilance against slugs, jamming, vandalism, and theft.
3. *Use of Parking Meter Revenue* while usually outside the traffic engineer's jurisdiction, is within his field of interest. Sound traffic engineering practice is best served if:
   a. No meters are installed merely to promote revenue for miscellaneous municipal purposes other than parking.
   b. Meter revenue is allocated in the following order of priority:
      1) Parking meter collection and maintenance.
      2) Other parking purposes.
      3) Other traffic engineering functions.
      4) Other municipal expenses.

. . . FOR 17¢ A SQUARE FOOT

Fast, one-step reflectorization as easy as painting! Hazards reflectorized with 3M's "Codit" Liquid flash brilliant warning at night for safety. Treatment costs a low 17¢ per square foot. Buy supply from your 3M Representative or write 3M Company, Dept. NR-87, St. Paul 6, Minnesota.

Get "Codit" Reflective Liquid in 6 oz. aerosol spray or 4 lb. can or complete safety kit.

PRODUCT OF 3M COMPANY RESEARCH

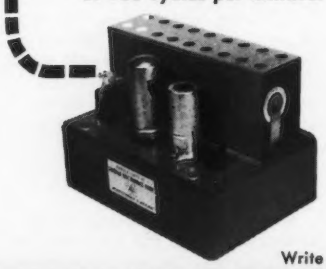


the NEW

F-2C FLASHER

outlives 'em all and costs less

Designed for high speed flashing of traffic signal lamps, the F-2C is an electronically controlled relay designed to pulsate the red light to provide greater target value and prohibit sun phanthom. Its flashing rate may be varied from 0 to 200 cycles per minute. As adjusted at the factory the contact dwell time is 50% with a flashing rate of 180 cycles per minute.



SOME OF THE MANY F-2C FEATURES

- Develops no radio noise.
- Will operate over 620,000,000 times before contact failure.
- Signal remains lit even if equipment failure should be encountered.
- Correctly installed should not require replacement for at least two to three years.

Write or telephone today for further information

GENERAL ELECTRONICS CORPORATION
17 Madison Avenue Montgomery, Alabama
Telephone: CHerry 7-7278

Coming Events

September 9-13—ILLUMINATING ENGINEERING SOCIETY —

National Technical Conference, Biltmore Hotel, Atlanta, Ga. Contact: IES, 1860 Broadway, N. Y. 23, N. Y.

September 16-19—INTERNATIONAL MUNICIPAL SIGNAL ASSOCIATION—

Annual Convention, Fontainbleau Hotel, Miami Beach, Fla. Contact: IMSA, 130 West 42nd St., New York 36, N. Y.

September 23 - 26 — INSTITUTE OF TRAFFIC ENGINEERS—

Annual Meeting, Statler Hotel, Detroit, Mich. Contact: ITE, 2029 K St. N.W., Washington 6, D. C.

September 24-27 — AMERICAN ASSOCIATION OF MOTOR VEHICLE ADMINISTRATORS —

Annual Conference, Hotel Roanoke, Roanoke, Virginia. Contact: AAMVA, 912 Barr Building, Washington 6, D.C.

October 13-17 — AMERICAN INSTITUTE OF PLANNERS —

Annual Meeting, Congress Hotel, Chicago, Illinois. Contact: AIP, 34 Brattle St., Cambridge 38, Mass.

October 14-18—AMERICAN SOCIETY OF CIVIL ENGINEERS—

National Convention, Statler Hotel, New York City. Contact: ASCE, 29 W. 39 St., N. Y. C.

October 21-25—NATIONAL SAFETY COUNCIL—

Annual Safety Congress & Exposition, Congress, Conrad Hilton and other Hotels, Chicago, Ill. Contact: NSC, 425 N. Michigan Ave., Chicago 11, Illinois.

November 18-22 — AMERICAN ASSOCIATION OF STATE HIGHWAY OFFICIALS—

Annual Meeting, Conrad Hilton Hotel, Chicago, Ill. Contact: AASHO, National Press Bldg., Washington 4, D.C.

1958

January 6-10—HIGHWAY RESEARCH BOARD—

Annual Meeting, Sheraton Park Hotel, Washington, D.C. Contact: HRB, 2101 Constitution Ave., Washington 25, D.C.

September 16-20 — FOURTH INTERNATIONAL STUDY WEEK IN TRAFFIC ENGINEERING—

Copenhagen, Denmark. Contact: World Touring and Automobile Organisation, 32 Chesham Place, London, SW1, England.

September 22-25 — INSTITUTE OF TRAFFIC ENGINEERS—

Annual Meeting, Columbus and McAllister Hotels, Miami, Fla. Contact: ITE, 2029 K St. NW, Washington 6, D.C.

Reyburn P. Hoffmann

Reyburn P. Hoffmann, a Founder of the Institute of Traffic Engineers, died June 28 at his home in St. Louis. He was 66 years old and had been under the care of a physician for some time.

Mr. Hoffmann had been Secretary-Manager of the St. Louis Safety Council for 26 years before retiring a year ago. Prior to joining the Safety Council in 1930, he was City Traffic Engineer. Earlier he had worked with Harland Bartholomew as a city planner and on the staff of the St. Louis City Planning Commission.

One of the small group of Traffic Engineers who met in Pittsburgh in October 1930 to agree upon the formation of a professional traffic engineering organization, Mr. Hoffmann was proud of the Institute and his association with it.

Mr. Hoffmann attended the University of Illinois from 1910 to 1914. During World War I, he spent 15 months in the U. S. Navy. He was a member of the American Society of Safety Engineers, a one-time member of the American Society of Civil Engineers, and a member of Kappa Sigma social fraternity in addition to this membership in the Institute of Traffic Engineers.

Survivors include a sister, 2 brothers and a daughter. His wife died two years ago.

Two Victims, 45,000 Yen Damages in Two Traffic Accidents per Hour

According to the 1956 traffic report of the Metropolitan Police Department, 19,593 traffic accidents occurred last year in Tokyo. They took the heavy toll of 766 deaths and 15,469 injuries, and destroyed properties amounting to 398,854,000 yen. In more impressive terms, traffic accidents occurred twice an hour, causing casualties of two persons and the destruction of property amounting to 45,000 yen.

As compared with 1955, the cases increased by 22%; injured persons, 38.8%; and the loss of property, 18%. Only the death toll decreased by 0.1%.

Traffic accidents, needless to say, increase in proportion to the increase in population and vehicles, dual elements of traffic volume.

The correlation between the accidents and these two elements during the last 5 years is shown below.

Of 19,593 cases of traffic accidents, 81.2% were caused by motorcars, 6.6% by bicycles, 6.3% by motorcycles, 5.1% by pedestrians, 0.7% by streetcars, and 0.1% by other carts. One-fourth of the motorcars which caused any mishap were taxicabs, and its frequency rate is 325 per 1,000 taxicabs.

As for the ages of the drivers who caused accidents, the twenties come at the top with 58%, followed by the thirties, those over forty, and those under twenty.

Speaking of the effect of experience, those having rather shorter experience of less than five years accounted for 65%, the top rate, of the drivers who caused accidents.

Of the causes of 15,917 accidents due to faults on the part of drivers, "violation of speed" ranks top, followed by "failing to turn the handle", "careless outstripping", "ignoring the pedestrians' priority", and "not slowing down". These items account for one half of the motorcar accidents.

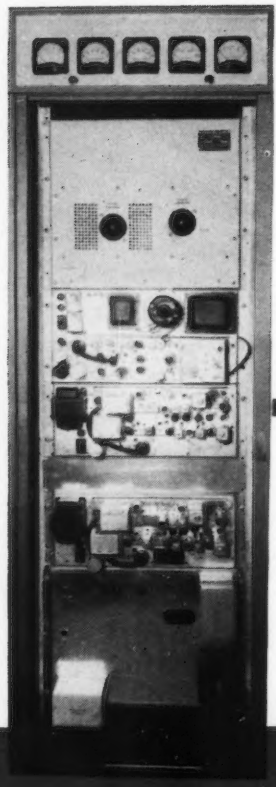
"Drunken drivers" increased conspicuously in comparison with those in the previous year. Investigation of the accused drivers shows that one driver per sixteen was more or less drunk.

Of 1,012 accidents due to the pedestrians' fault, 44.4% resulted from "careless crossing", 18.2% from "stepping on a driveway".

—from *Tokyo Municipal News*, May 1957

Year	Population	Vehicle	Accidents	Deaths	Injuries
1951	6,748,950	84,956	8,580	425	4,515
1956	8,294,544	286,462	16,593	766	15,469
Increase by	22%	237%	93 %	80%	243%

Program Device
Master Controller
Master Tone Translator



FM 250-watt Transmitter

CUT CABLE C

SELECT EITHER OF THESE 2 NEW

Monotrol
Master Controller

Mail Coupon Today!

EAGLE SIGNAL CORPORATION
Municipal Division, Dept. TE-857
MOLINE, ILLINOIS

Please rush me data on . . .

( ) Eagle Monotrol system ( ) Eagle radio system

NAME AND TITLE

MUNICIPALITY

FULL ADDRESS

OSTON CHOOSES radio TRAFFIC SYSTEM NEEDS NO INTERCONNECTING CABLE!

harles W. Greenough, Chairman and Benjamin W. Fink, Director of Parks ngineering will save Boston's Metropolitan District Commission $100,000 their first installation of just 8 intersections!

he Master Controller receives information from the Program Device and ends this information to the Master Tone Translator which sets up the pattern r the proper tone signals. The FM 250-watt transmitter broadcasts these ne signals to the local or Secondary Tone Translators at each intersection the system. These Secondary Tone Translators convert this tone signal o appropriate voltages which are in turn applied to the local controller. sic equipment provides for the transmission of program information for functions. Additional equipment, capable of being added in the field, will pand this system up to 30 "ON" or "OFF" functions.

FM Receiver and Secondary Tone Translator

Traffic Signal Controller

CTS

S—BOTH BY . . .

EAGLE

EAGLE SIGNAL CORPORATION
Municipal Division
MOLINE, ILLINOIS

ORIA CHOOSES monotrol® TRAFFIC SYSTEM USES EXISTING 2-WIRE CABLE!

e City of Peoria, Illinois, put in this Monotrol system without tearing streets to install expensive multi-conductor cable between master and al controllers.

er the existing 2-wire circuit, Monotrol provides 60 traffic pattern anges a week . . . allows for 31 functions. All automatically controlled m a central point!

hat's more, Monotrol opens up fire, police and ambulance routes by shing a button . . . and permits unscheduled emergency changes in nction by dialing a number.

Traffic Signal Controller

Professional Service Directory

DE LEUW, CATHER & COMPANY
CONSULTING ENGINEERS

Public Transit — Subways
Traffic & Parking — Railroad Facilities
Expressways — Industrial Plants
Grade Separations — Municipal Works
Urban Renewal — Port Development

150 North Wacker Drive, Chicago 6
San Francisco — Toronto — Oklahoma City

TRAFFIC ENGINEERING — HIGHWAY PLANNING

BRUCE CAMPBELL & ASSOCIATES
ENGINEERS

177 MILK STREET • BOSTON 9

PARKING — AIRPORTS — SHOPPING CENTERS

ALFRED KAEHRLE ASSOCIATES
CONSULTING ENGINEERS

Highway Planning — Highway Design
Traffic Engineering Surveys
Parking Studies — Shopping Centers

10 North Main Street
West Hartford 7 — Connecticut

GEORGE W. BARTON & ASSOCIATES
CONSULTING ENGINEERS

Traffic - Transportation
Parking - Highways

600 Davis Street
Evanston — Illinois

FREDERICK L. BELL & ASSOCIATES, Inc.
CONSULTING ENGINEERS

Traffic & Parking Surveys
Street & Highway Design

Suite 110 Petroleum Bldg., Phone 2-0359
Tallahassee — Florida

MEMBERSHIP APPLICATIONS

The following applications have been received since the list published in the July issue.

APPLICATIONS FOR TRANSFER

ALLEN, Robert J.
Assistant Manager, Accident Prevention Department, 60 John Street, New York 38, New York. June 5, 1957 for MEMBER grade.

KENEIPP, J. Marshall
Traffic Engineer, George W. Barton & Associates, 600 Davis Street, Evanston, Illinois. June 28, 1957 for MEMBER grade.

LAPIN, Howard S.
Transportation Planning Analyst IV, Philadelphia Urban & Transportation Board, Room 1510, Market Street National Bank Building, Philadelphia, Pennsylvania. June 27, 1957 for ASSOCIATE grade.

LEWIS, Ralph G., Jr.
Assistant Traffic Engineer, 215 City Hall, Chatanooga, Tennessee. June 17, 1957 for ASSOCIATE grade.

MELE, Charles N.
Traffic Engineer III, Bureau of Street Traffic & Parking, 320 North Clark Street, Chicago 10, Illinois. June 27, 1957 for ASOCIATE grade.

SCHOPPERT, David W.
Highway Transport Engineer, Automotive Safety Foundation, 200 Ring Building, Washington 6, D. C. July 3, 1957 for ASSOCIATE grade.

SMITH, Edward L.
Senior Traffic Engineer, National Safety Council, 425 North Michigan Avenue, Chicago 11, Illinois. For ASSOCIATE grade.

STRONG, Charles P.
Assistant Highway Engineer, California Division of Highways, 4075 Taylor Street, San Diego 10, California. July 1, 1957 for ASSOCIATE grade.

WILCOX, Ross G.
Senior Engineer, Portland Cement Association, 33 West Grand Avenue, Chicago 10, Illinois. July 1, 1957 for ASSOCIATE grade.

NEW APPLICATIONS

BACKMAN, Charles E.
Assistant Highway Engineer, California Division of Highways, 1976 East Charter Way, Stockton, California. June 24,1957 for ASSOCIATE grade.

BROWN, Gerald R.
Traffic Studies Engineer, Ontario Department of Highways, Parliament Buildings, Toronto 2, Ontario, Canada. June 27, 1957 for JUNIOR grade.

BURGESS, William F.
Traffic Engineer, City Hall, Tyler, Texas. June 14, 1957 for ASSOCIATE grade.

BUSHNELL, Keith E.
Highway Traffic Engineer III, Michigan State Highway Department, Planning & Traffic Division, Stevens T. Mason Building, Lansing, Michigan. June 12, 1957 for MEMBER grade.

CHANN, Irving K.
Traffic Analyst, Parsons, Brinckerhoff, Hall & MacDonald, 51 Broadway, New York, New York. June 25, 1957 for ASSOCIATE grade.

COLEMAN, James E.
Highway Traffic Engineer (Captain, U. S. A.), Office of Special Assistant for Transportation Engineering, Dept. of the Army, OSATE, OCOFT, Washington 25, D. C. June 19, 1957 for JUNIOR grade.

GONSETH, Alan T.
Planning Technician, The Port of New York Authority, 111 Eighth Avenue, New York 11, New York. June 13, 1957 for JUNIOR grade.

HAGOOD, Thomas M., Jr.
Senior Traffic Engineer, Texas Highway Department, District No. 1, P. O. Box 178, 1365 North Main Street, Paris, Texas. June 21, 1957 for ASSOCIATE grade.

PEARSON, Russell C., Jr.
Traffic Engineer, Wisconsin Highway Commission, State Office Building, Madison, Wisconsin. July 1, 1957 for JUNIOR grade.

INDEX TO ADVERTISERS

A'G'A Division of Elastic Stop Nut Corporation 499
Automatic Signal Division of Eastern Industries, Inc. 524
Cataphote Corporation 500
Duncan Parking Meter Corporation 502
Eagle Signal Corporation ..... 540 & 541
Flex-O-Lite Manufacturing Corporation 504
General Electronics Corporation 538
Minnesota Mining & Manufacturing Company ..516, 521, 528, 531 & 537
Prismo Safety Corporation ..... Back Cover
Radiator Specialty Company 526
Rockwell Manufacturing Company 498
Streeter-Amet Company 529
Veon Chemical Corporation 525

Professional Service Directory

EDWARDS, KELCEY and BECK
CONSULTING ENGINEERS

Surveys — Reports — Economic Studies — Design — Supervision
Transportation — Traffic — Parking — Terminals — Port and Harbor Works
Highways — Expressways — Grade Separations — Tunnels
Bridges — Water Supply — Management

3 William Street, Newark 2, N. J. • **250 Park Avenue, New York 17, N. Y.**

PARSONS, BRINCKERHOFF HALL & MACDONALD

Engineers

Bridges, Highways, Tunnels, Airports, Subways, Harbor Works, Dams, Canals, Traffic, Parking and Transportation Reports, Power, Industrial Buildings, Housing, Sewerage and Water Supply.

51 Broadway **New York 6, N. Y.**

THE H. K. FERGUSON COMPANY

ENGINEERS AND BUILDERS

PARKING AND TRAFFIC SURVEYS • ECONOMIC STUDIES
GARAGE DESIGN AND CONSTRUCTION

New York - Cleveland - Cincinnati - Chicago - Atlanta
Los Angeles - San Francisco - Toronto - London

HARDESTY & HANOVER
CONSULTING ENGINEERS

BRIDGES — Long Spans of All Types
Movable — Lift, Bascule & Swing
Hanover Skew Bascule
Grade Crossing Eliminations
Other Structures Foundations
Expressways and Thruways
Design — Supervision — Inspection
Valuation — Reports

101 Park Avenue **New York 17, N. Y.**

PALMER AND BAKER ENGINEERS, INC.
CONSULTING ENGINEERS — ARCHITECTS

Surveys — Reports — Design — Supervision — Consultation
Transportation and Traffic Problems Tunnels Bridges Highways Airports
Industrial Buildings Waterfront and Harbor Structures
Graving and Floating Dry Docks
Complete Soils, Materials and Chemical Laboratories

Mobile, Ala. **New Orleans, La.** **Washington, D.C.**

S. Herbert Taylor Frank J. Sleeper
David L. Taylor William H. Taylor

SHERMAN, TAYLOR & SLEEPER
CONSULTING ENGINEERS

501 Cooper Street, Camden 2, N. J.
EMerson 5-0555
Park & Norwod Aves., Pennsauken 8, N. J.
MErchantville 8-4848

GANNETT FLEMING CORDDRY and CARPENTER, INC.
- - - ENGINEERS - - -

CONSULTING SERVICE FOR TRAFFIC, PARKING and TRANSPORTATION PROBLEMS
City Planning — Highways — Bridges — Flood Control
Water Supply — Sewerage— Industrial Waste — Garbage Disposal
Appraisals — Investigations — Management

600 NO. 2nd STREET HARRISBURG, PA.
Pittsburgh, Pa. Philadelphia, Pa. Daytona Beach, Fla. Medellin, Colombia, S. A.

JENKINS, MERCHANT & NANKIVIL

Consulting Engineers

Municipal Improvements Sewerage
Power Development Water Systems
Traffic Surveys Industrial Plants
Flood Control Recreational Facilities
Airports Investigations and Reports

805 East Miller Street
Springfield, Illinois

TRANSPORTATION PROBLEMS
HIGHWAYS

THE CLARKESON ENGINEERING COMPANY
INCORPORATED

285 Columbus Ave., Boston 16, Mass.
COmmonwealth 6-7720

EXPRESSWAYS **AIRPORTS**

HIGHWAY TRAFFIC ENGINEERS, INC.

Traffic - Parking - Transportation
Economic Studies - Financial Reports
Traffic Control - Design of Lighting
Systems and Communications

361 Boylston Street
Brookline 46, Massachusetts
LOngwood 6-0275

TIPPETTS — ABBETT
McCARTHY — STRATTON
Engineers
Traffic, Parking and Transportation
Surveys, Economic Studies and Financial Reports
Highways, Subways, Bridges, Tunnels—Airports, Ports, Harbors, Power Developments, Water Supply, Sewerage
Planning, Reports, Design, Supervision of Construction

62 West 47th St. 110 Market St.
New York 36, N.Y. San Francisco, Cal.

"BACK IN 5 YEARS!"

PLASTIX LEGENDS

Prefabricated, reflective, standard pavement word markings that shout safety day and night. Each legend supplied in kit form, complete with adhesive, thinner, stirring paddle and simple layout. All standard legends available plus letters and numerals from which you can make your own message. 10-foot characters for speeds over 35 MPH, 5-foot characters for speeds under 35 MPH. Shown below are a few of the many legends in stock.

SLOW	LEFT	AHEAD
STOP	RIGHT	SCHOOL
SLO	THRU	BY-PASS

That's traffic pavement marking with PRISMO PLASTIX! In the heaviest traffic spots—even when subjected to severe weather and atmospheric conditions—the average wear life is 4 to 6 years for these permanent-type reflective markers. What's more, application is quick and easy with a fast-drying cold adhesive. Plastix gives full reflective value from the moment it's put down, keeps its original brilliance for the life of the material.

Low operating cost, ease of application and can't-be-beat durability make Plastix the logical choice for modern pavement marking.

Available in vivid yellow, white and red, as well as in many varied shapes, Plastix can solve any pavement marking problem economically.

GET ALL THE FACTS TODAY . . . send for catalog PX-56.

PRISMO

The SPHERE of SAFETY

SAFETY CORPORATION
Huntingdon, Pennsylvania